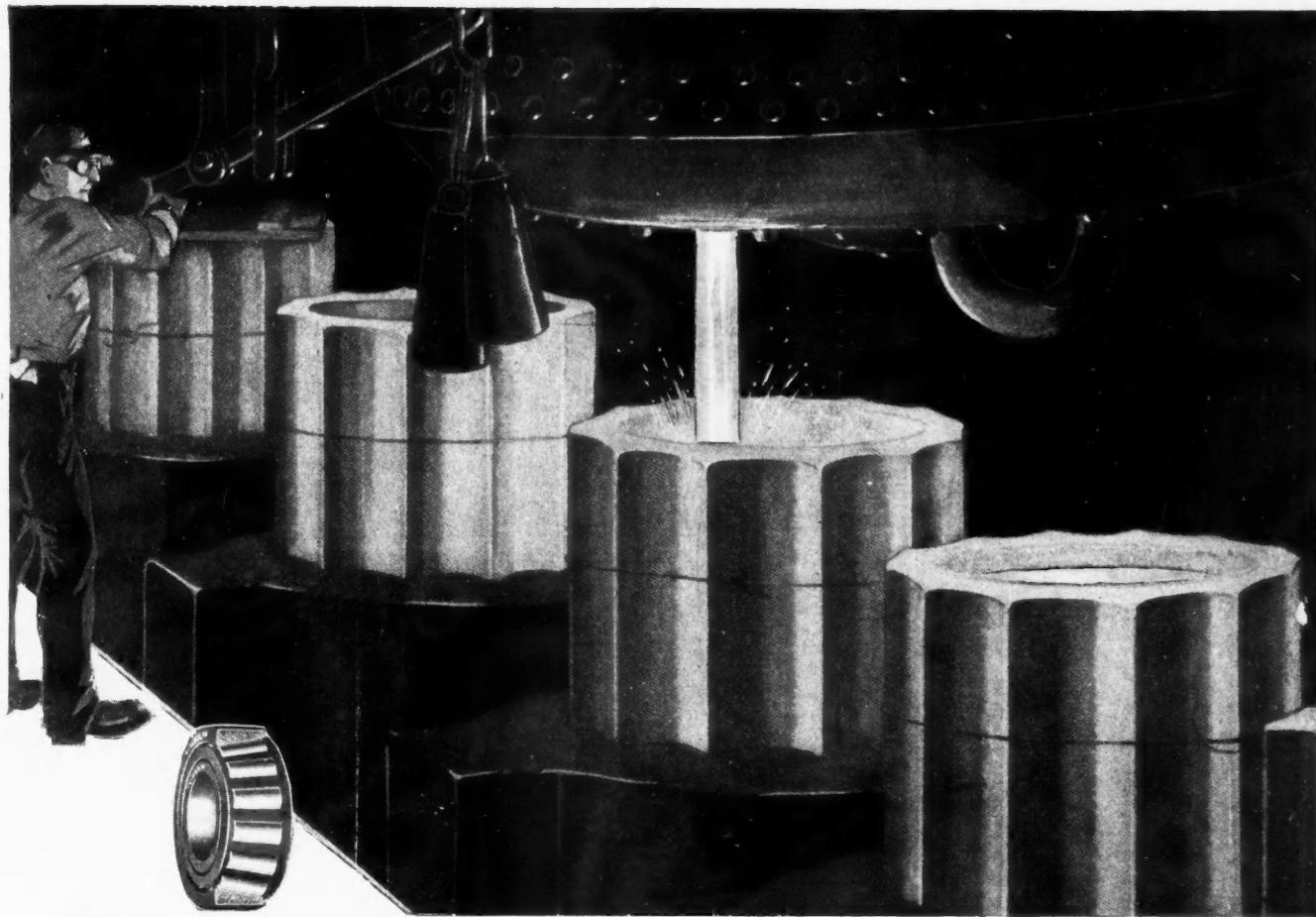


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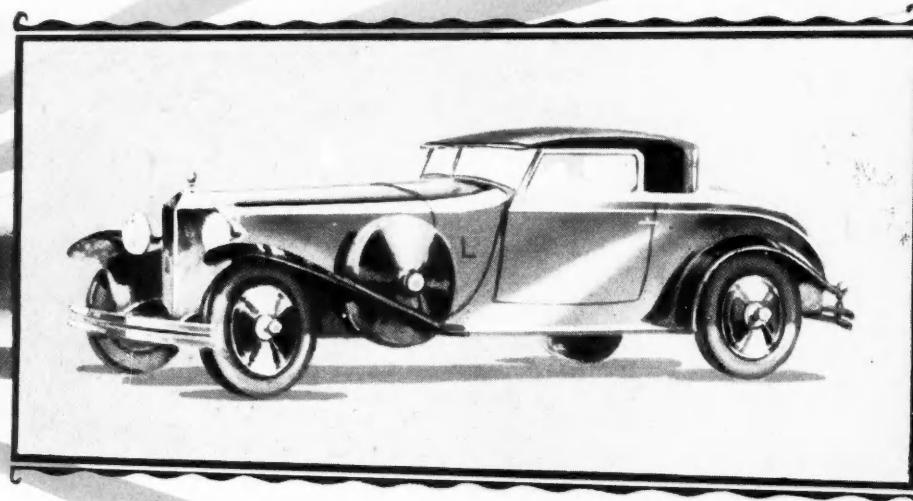
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Vol. 60

No. 9

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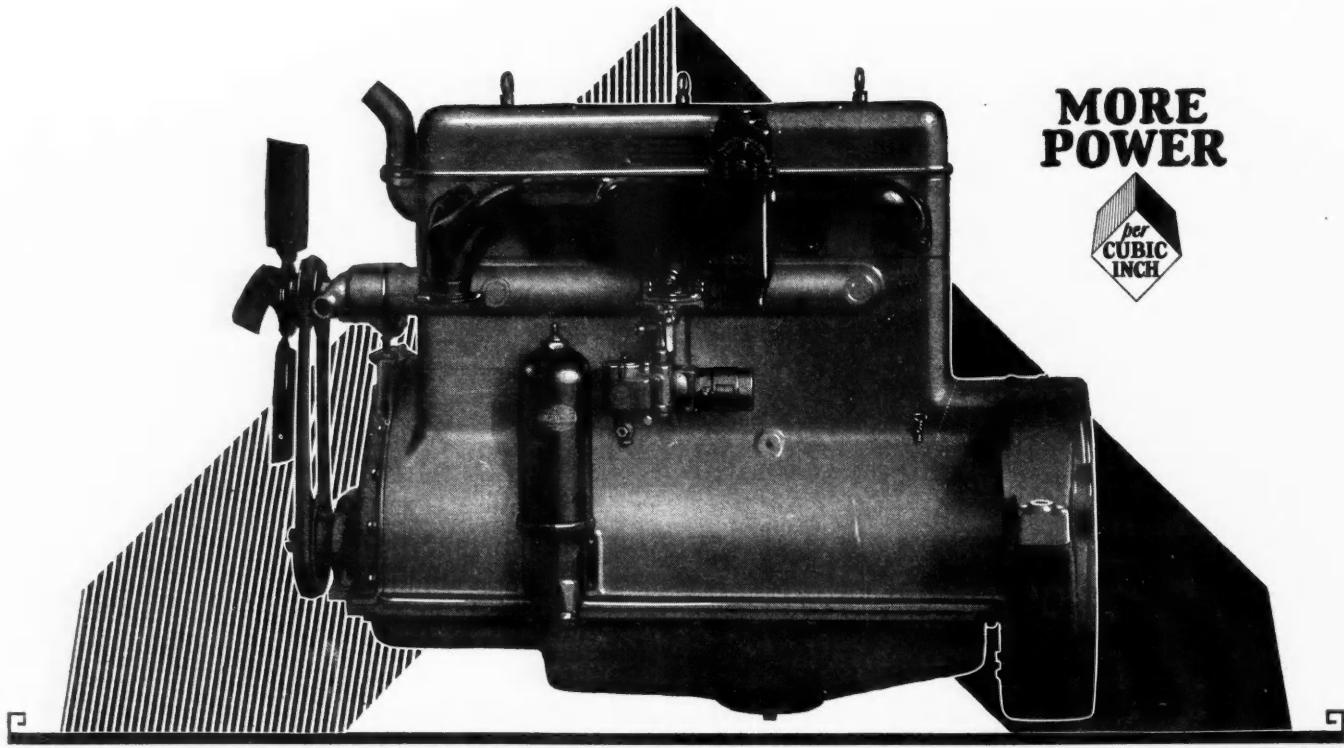
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New *Features* Possible in Future Automobile Shows

Continued success of national and local exhibits certain, but search for new ideas goes on. Fresh attendance-building features appear each year. Sales volume is good.

By Norman G. Shidle

FOR nearly 30 years the automobile shows, national and sectional, have been vital important merchandising factors for the industry. There is every indication that they will continue to grow in value and importance during every succeeding year in the next quarter of a century.

Slight declines in attendance at many of the 33 out of 47 automobile shows of 1929 already held, while generally known throughout the trade, have caused little comment and no alarm. The fundamental public interest in these exhibits has been proved to be still as strong as it ever was. Continued car improvements cause continued public interest.

There does seem to be abroad, however, a very keen interest on the part of men in every branch of the industry in speculating about how future shows are going to be made even better than past ones and as to whether or not the automobile shows of 1940 will differ materially from those of 1930.

No serious import has been assigned therefore to the slowing up of automobile show turnstiles. There seems to be no justifiable reason for concern, considering the satisfactory sales results that have continued to be reported. Orders in January evoked from the factories record production efforts providing approximately 400,000 cars, a number never equaled in the industry in

January and most nearly approached by the turnout of January, 1924, when about 330,000 units rolled off the assembly lines. What's more, estimates of last month's output have rated it as an all-time production record for February.

Assurance has been expressed that an industry which has overcome obstacles and hindrances, such as have been conquered in the making of automobiles in the last 25 years, will exert its massed intelligence and ingenuity until public feeling toward its expositions will be transformed into even greater interest and enthusiasm.

Just how the industry will apply its energies to the situation remains to be determined. Generally speaking, it would seem logical to approach the problem from the standpoint of "What can be done to make the shows even more vital and attractive?" rather than from the negative angle of "How shall we try to stop some current practices which seem unfavorable to show attendance?"

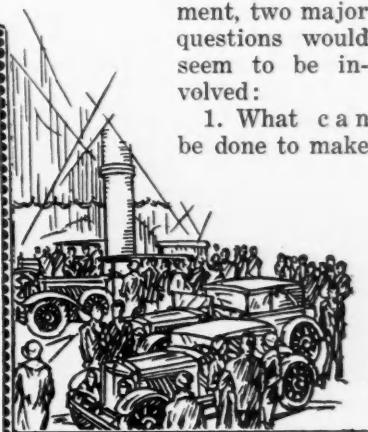
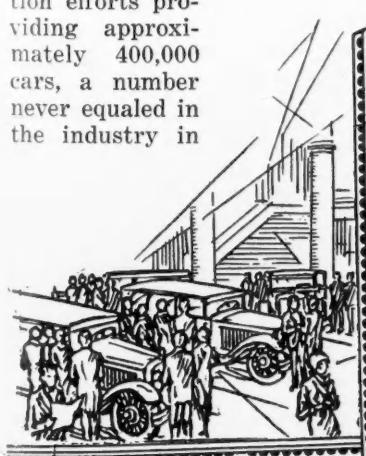
Point of view in approaching the problem, while naturally an abstraction, may be a determining factor in the effectiveness of the measures evolved.

Approaching the question solely from the positive side, for the moment, two major questions would seem to be involved:

1. What can be done to make

Satisfactory attendance at automobile shows no longer is merely one of total numbers. Public interest has taken care of that for many years. Among the chief recent problems has been that of stimulating attendance at certain times of the day or week when visitors normally are few, and of finding ways to care for the vast evening crowds conveniently.

This article talks about this and other subjects, discussing some possibilities of various kinds for future shows, dealing with the matter in purely informal terms.



the show itself more attractive from a box office standpoint?

2. How can the features of any given show be advertised or merchandised more effectively?

The first question, obviously, is the essential one, if we proceed on the "mouse-trap" theory. Experienced show managers have been concentrating on it for a number of years. Consequently, it is reasonable to assume that no quick cure-all in the way of a brilliant idea will be found in answer. A few fundamentals, however, probably warrant discussion.

To begin with, a number of executives and dealers who have been thinking rather seriously about the shows have come to feel that the ideal show "feature" is one which has both an appeal for the public and a tendency to focus the visitor's mind on automobiles or the automobile industry. That combination isn't easy to obtain. Its desirability, however, would seem to warrant intensive thinking before it is pronounced impossible.

To illustrate: A bathing beauty contest undoubtedly creates interest, but how much attention it helps to focus on the automotive industry and its exhibits at least is open to question.

The usual type of static "educational" exhibit, on the other hand, while it may be highly informative to those already concerned, has little human interest appeal. It permits but does not compel interest.

Somewhere between those two extremes certain automotive men seem to feel, lies the opportunity of the automobile shows of the future. Interest rather than beauty appears likely to be the keynote of the exhibitions of coming years.

Exhibits of Interest vs. Beauty

For example, a huge power press in action is not beautiful in any ordinary sense, but its majesty of strength and the specificness of its purpose certainly would seem to give it more show attraction value than a beautifully decorated tower or pillar erected as the centerpiece of an automotive exhibition. And the power press could be tied in with the motor vehicles and parts being shown without difficulty. An assembly line in action might mar the fulsome beauty of an overall photograph of an automobile show, if it were feasible to set it up in an exposition, but it would attract more people than paintings of street scenes in Venice—and it would fit in with the products on exhibition.

How many car owners have the slightest idea of what is meant by a crankshaft "statically and dynamically balanced," despite having had many advertisements urge this as one reason why they should purchase a particular automobile? Why not statically and dynamically balance a few crankshafts in public? Aren't there some inspection operations which readily could be performed and which would lend themselves to dramatization at an automobile show?—optical gear tooth inspection perhaps? Such an exhibition would help emphasize vividly the accuracy and precision with which even the lowest priced cars are built. A score of other possibilities are certain to occur to technical men, should they start

thinking along these lines.

The vast, proved attraction value of such old devices as the stripped chassis with moving parts would seem to be a strong indication of the practicability and possibilities of new show features built along similar lines—features involving motion of some kind—motion being a fundamental in the conception of any motor vehicle.

A multitude of practical difficulties immediately arise, of course, in the way of introduction of features of the kind mentioned. Show rules limit the possibilities of individual exhibitors. If exhibits of such a character are to be put on by the show management, whose machines and products are to be utilized in the general exhibits?

Fire rules of individual buildings will offer limitations. In other instances, jealousies among various exhibitors may cause trouble for the show managers, and a vast, fearsome array of reasons why "it

can't be done" are bound to rear themselves.

That's where the point of view comes in. Firm belief, to begin with, that something can be done probably will enable the overcoming of at least a third of the "insurmountable difficulties." The other two-thirds, perhaps, wouldn't be licked. But progress would have been made.

Perhaps this whole line of thought is in the wrong direction. Some entirely different approach may offer a better opportunity for increasing show attendance and interest in show products. The foregoing is offered merely as what appeals to a few men who have been thinking about the subject fairly seriously.

Whatever special features may be feasible, the possibility of more specific and definite treatment of them in advertising and advance promotion work would seem to exist. The very intensive and effective advertising that has preceded both past national and local shows has centered largely around each exhibition as a whole. If a number of new innovations were to be seen at a show, it would seem possible to build advertising and promotion material that would mention specific attractions at the exhibit and thus further capitalize the interest value of every item in the exposition.

With experienced show managers in charge of practically every automobile show today, the latter phase perhaps doesn't need considerable discussion. The average show manager probably can be counted upon to capitalize thoroughly on what he has. Additional thought along definite lines, however, might result in further advances in this regard.

New Model Announcements

The appeal of individual shows unquestionably would be enhanced if at least two or three new models could be exhibited to the public for the first time in their localities at the show itself. While manufacturers doubtless will continue to announce their new lines at such times as seem most advantageous from an individual marketing standpoint—and it is logical that they should—it would seem possible that some consideration might be given to the value of new models to the shows when announcements are being planned somewhere around show time anyhow.



Crowds still are large at automobile shows

Chief among distractions from American automobile shows of recent years, especially the New York and Chicago Shows of 1928 and 1929, have been special showings of cars in hotel lobbies and salesrooms simultaneously with the main exhibitions. These outside activities have been credited with diverting more persons from the shows than influenza warnings and epidemics, the unpleasantness of mingling in large crowds or exhaustion of the novelty of automobile expositions. And there can be no denying that novelty is a most influential factor on the side of increasing attendance, judging from the large numbers who visited the aeronautical show in Grand Central Palace, New York City, in February.

A movement urging discontinuance of special showings of cars publicly in hotel lobbies and elsewhere at the time of a main exposition in a city has been current for some time.

The National Automobile Chamber of Commerce has considered the proposal but so far has taken no definite action as a body.

Opposing this idea is one contending that the main show should be developed to overcome any present embarrassment without attempting to altercate over the ethics of special hotel showings or other outside attractions. This would give an open field to those interested in special showings and probably would result in an

increase in exploitation of such showings through the exertion of competitive influences.

The latter viewpoint seems the more logical. It also apparently would be more feasible relative to the question of whether announcing and showing new models at irregular intervals before and after show time should be continued instead of concentrating those debuts in the main show season, as some enthusiasts have urged.

Further discussion of the hotel exhibition question is expected at the N.A.C.C. directors' meeting scheduled to be held in Detroit next week.

It is interesting to note a recent decision of the Society of Motor Manufacturers and Traders, Ltd., prohibiting members from taking part in rallies and motor "Beauty Shows" in Great Britain, is proving extremely unpopular in certain quarters, an announcement by the United States Department of Commerce has stated. The organization controls all exhibitions in Great Britain. Its decision was said to have been based upon the ground that rallies, which have been successful on the Continent, might eventually detract from the annual Olympia Motor Show and the annual Scottish Show at Glasgow.

Whatever differences or controversies that may arise in relieving the situation, however, would seem to be secondary to the steadfast conviction of the industry that, in the terms of the circus, "the show will go on."

Over-Drive Incorporated in Essex Speedster

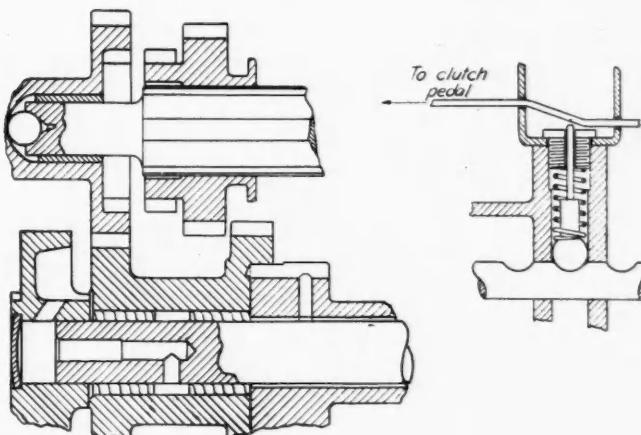
AN interesting deviation from common practice is found in the transmission of the Speedster model of the 1929 Essex line, just introduced. Since this model has a somewhat lower weight and considerably less head resistance than standard closed models, for which the regular Essex transmission is designed, the Hudson Motor Car Co. felt that these facts should be taken advantage of by the provision of a higher top-speed with relatively lower engine revolutions per mile. The customary way to achieve this end is to provide a lower rear axle gear ratio. While in the Essex speedster the final reduction has been dropped from 5.6 to 5.09, it was felt that the top-gear total reduction could be decreased even further, and with this end in view a three-speed transmission was developed in which an over-drive is substituted for the usual intermediate set of gears. In the production of this new transmission all of the parts of the standard transmission are used, with the exception of the constant mesh gears (the countershaft unit of which includes the second speed drive gear) and the gear unit on the main shaft composed of the direct drive and second-speed driven gear. For these gears have been substituted others of an inverse ratio. With this design the countershaft gears have a higher rotative speed than the mainshaft. The gear normally used for second-speed drive on the countershaft is also larger than its mating gear on the mainshaft, so that a still higher mainshaft speed is obtained, the ratio in this speed being 0.7796 to 1.

Since the low speed and reverse gears have been unchanged, the final transmission ratios, due to the higher countershaft speed, are lower than in the standard Essex transmission, low speed having been reduced from 3.244 to 1.946 to 1 and reverse from 4.17 to 2.563 to 1. The new low speed ratio is practically identical with that used in second speed in the standard Essex transmission. In effect, therefore, the new unit, except for the differences in shifting, compares with the old unit in

that the low speed has been dropped and an overgear substituted.

Owing to the higher rotative speed of the countershaft main gear cluster, Hyatt roller bearings have been substituted for the bronze bushings used in the standard transmission. Lubrication of these bearings is obtained as in the standard unit by centrifugal action, oil being fed into the drilled countershaft proper by gravity and then thrown out through a drilled hole through the rotation of the gears.

With the use of the overgear, a secondary clutch-operated lock has been provided, as shown in the accompanying sketch. Depression of the clutch pedal releases a pin permitting the locking ball to release the shifter rod, while engagement of the pedal depresses the pin again and locks the ball in place.



Left—Sketch of Essex Speedster transmission constant mesh and overspeed gears

Right—Sketch of direct and overspeed lock in Essex Speedster transmission

European Engine Designs Bring

British trend is toward manifolds of simplest possible contour. Small powerplants designed for high performance are usually equipped with dual carburetors.

By Oswald Hayes

THE problem of carburetion presents itself rather differently to the automobile and carburetor engineers of America and Europe respectively. This is due very largely to the differences in size and characteristics of the average car engines, and in the requirements of owners on opposite sides of the Atlantic.

There is no need here to specify the characteristics of the average American engine, nor the demands which American automobile and carburetor engineers have to meet. But it may be pointed out that their European confreres have to keep in mind three important considerations, representing differences between European and American conditions. These considerations are:

1. The relatively small engine must be capable of producing a very high m.e.p. all the way up the r.p.m. scale to a normal maximum of 4500 to 6500 r.p.m.
2. The characteristics of the fuel that will be used.
3. The natural "amateur mechanic" tendency of most European motorists.

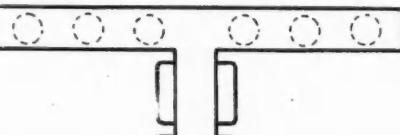
The first point constitutes, of itself, a real problem, and is necessitated by the prevailing demand for a small engine (usually of between 1.5 and 2.5 liters displacement) in a chassis capable of carrying a sedan body of ample proportions for four or five adults. The effect is to force the automobile designer's hands in several respects and to compel him to work under very difficult conditions. He adopts a really high compression ratio, a valve timing which is—to say the least—rather "spread out," and other characteristics which appertain to the "high-efficiency" engine rather than to the smooth and flexible type that is so desirable.

The carburetor engineer is called in to assist. The required power demands large choke areas, large inlet manifolds and low gas speeds; at the same time there

is need for "snap" acceleration from a literal walking pace, and from any point within the speed range of the engine and car.

Entirely different is the comparatively easy task of carbureting a large engine, using choke areas on the small side and high inlet-pipe depressions; for, with a

Fig. 3—Exhaust or water jacket on riser



small high-speed power unit, such methods produce a hopeless tailing-off of power, and the maximum speed falls short of what is demanded. Further, the simple method of intense hot-spotting to produce a stable mixture, easily distributable, is obviously barred, as the slightest loss of volumetric efficiency, due to rarefaction of the charge, has to be guarded against to the utmost.

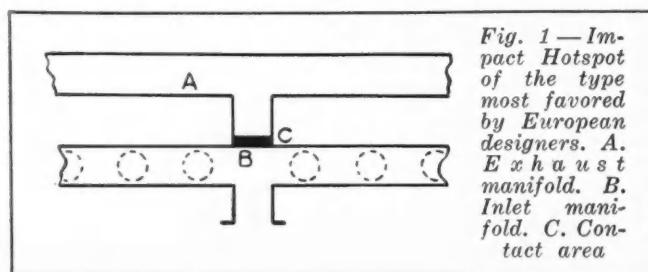
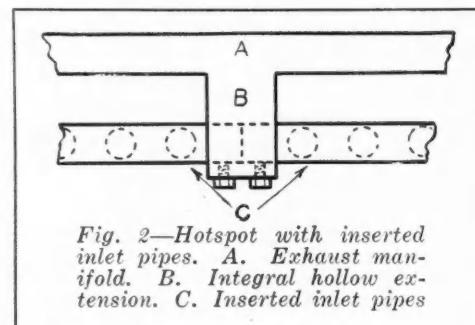
Regarding the characteristics of British fuel, these vary greatly from those common to American fuel. The lower endpoint under standard conditions of test, higher initial volatility, etc., are well known and need no comment. They are of material assistance to the carburetor designer, however, and they reduce the necessity for

the intense hot-spotting which some American engineers seem to find essential, and which causes certain American cars, running in Great Britain, to "cook" their mixture, thus producing loss of sustained power and overheating.

The limit to which it is possible for the European designer to go is to produce a fairly well "fogged" type of mixture, for any approach to complete vaporization becomes very adversely apparent in terms of power output.

The tendency of a large proportion of European car owners to attempt to secure improvement by adjusting anything that is adjustable almost compels the European carburetor designer to provide the maximum degree of simplicity and fool-proofness, eliminating the many small and adjustable parts which the American motor-

Fig. 2—Hotspot with inserted inlet pipes. A. Exhaust manifold. B. Integral hollow extension. C. Inserted inlet pipes



Special Carburetor Problems

ist seems content to regard with complete detachment. Carburetor simplicity in Europe is not a fetish, but a prime necessity.

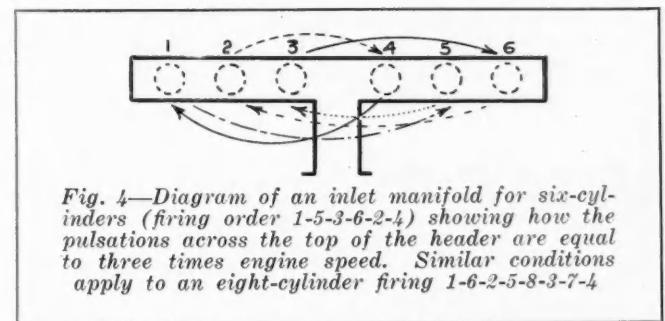
In examining the chief controlling factors of carburetion under the conditions mentioned it will be well to classify them under three heads, viz.: (1) Inlet Manifolds, (2) Carburetors and (3) Other relevant considerations.

Curly manifolds, those giving an equal length of tract to each cylinder, and very small pipes with sharp corners or 45-deg. bends, are largely regarded as obsolete. It is understandable that the designer, faced for the first time with the necessity to carburet a relatively small six or eight-cylinder engine, with power at high speeds of paramount importance, fell back on the small-diameter cold inlet pipe, with sharp corners to create turbulence of the charge. Results seemed to indicate that more was gained by the resulting turbulence than was lost by the intensification of pumping losses, which was the inevitable corollary. The fact that refraction

OSWALD HAYES is a consultant on the British staff of one of the foremost European carburetor makers, and his duties bring him continuously into contact with automobile manufacturers' carburetion problems. His abilities in solving the latter have earned for him an enviable reputation in the British motor industry. The opinions set forth here are based upon practical experience with a wide variety of engine types.

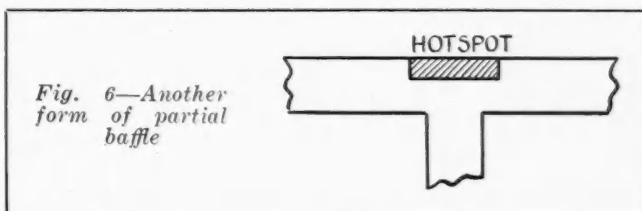
appears to gain by the use of buffers, the normal condition of over-richness in the cylinder firing after the shorter interval being appreciably minimized. The

writer has to confess that he has never succeeded in tying down the dimensions of a buffer to any set formula. Several times he has thought he had done so, but subsequent application disproved it. Errors of observation were responsible undoubtedly.



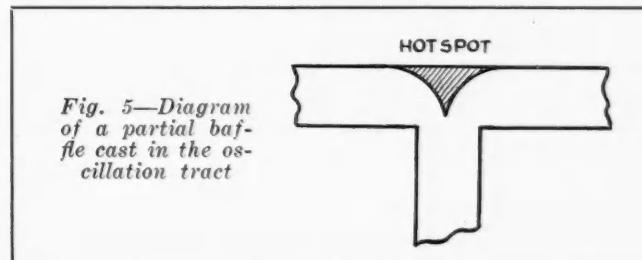
of a fuel-air mixture could be a two-edged sword was at first not realized; the use of manifolds with glass inserts helped but little, since the path of any given mixture strata through a complicated change of direction was impossible to follow.

Today the tendency in British and European design is to use manifolds of the simplest possible contour, involving a minimum of directional changes. The use of buffer ends seems to be guided purely by considerations of port arrangement and the method of hot-spotting. Thus a six-cylinder engine with six inlet ports and a central hot-spot gains no appreciable advantage from the incorporation of buffer ends. On the other hand, an engine having "siamesed" end ports certainly



The junction of the riser and what may best be termed the oscillation tract, invariably takes the form of a "T," which remark applies also to the off-takes from oscillation pipe to inlet ports. Certainly these directional changes are extremes, and hydraulics condemn this layout. But in dealing with a gasoline-air mixture, no other path which avoids extreme bias, or local changes in cross-sectional area, seems commercially possible.

Manifolds are naturally kept down to a minimum length, if only with the object of securing the least possible trouble with critical wave-lengths. External pipes are almost universal, for which the carburetor engineer is duly thankful. Seldom does a "cast-in" manifold work successfully with more than four cylinders. Indeed, the writer can remember only one which was reasonably good, and this functioned well chiefly by reason of its being used with a comparatively large



engine, thus permitting of generous hot-spotting internally, yet giving the required maximum power because of the piston displacement.

High gas speeds, while very helpful over the low-speed range, are necessarily a mixed blessing. Designers who want a really high m.e.p. at maximum r.p.m. put in low gas speeds at valve, port and manifold, and leave it to the carburetor designer to provide the flexibility and acceleration from low r.p.m.

The large six or eight-cylinder engine (by "large" is meant anything over 2.5 liters, though any purely arbitrary dimension must necessarily be subject to controversy) designed for the high duty which European standards demand, seems to call for a dual carburetor and manifold layout, probably by reason of the uninterrupted length of manifold necessitated by a single instrument, which causes serious pumping losses, and renders the amplitude of the pulsational reversals at high speeds virtually unmanageable.

By sacrificing some of the power toward the peak of the r.p.m. curve, the use of one carburetor on a large engine is quite satisfactory, as evidenced by the fairly universal application of it to American cars.

As regards small engines built with the main object of achieving a very high performance, these usually carry a dual carburetor, but, owing to smaller size, a single instrument gives quite good performance, since the pumping losses and pulsational reversals do not assume such alarming magnitude. One finds therefore that the majority of small six and eight-cylinder European engines function on one instrument.

The most popular manifold for European six-cylinder engines with a single carburetor is shown diagrammatically in Fig. 1. From the superimposed exhaust manifold, an integral extension depends, meeting a horizontal table machined on the top face of the inlet manifold. For constructional reasons, it is easier to arrange for the faces to be bolted together. The extension from the exhaust manifold proper is hollow, but provided with a thin floor to face up to the inlet-pipe table. Thus all troubles which an open end and a sealing washer would imply are avoided. The obvious thing to say of this layout is that the hot-spot effect is, by European standards, quite intense, but extremely local. The exact area heated depends on the position of the depending portion of the exhaust manifold (i. e., how many cylinders feed into it effectively), the length of this portion, and the thickness of the dividing wall and inlet pipe table. Taking these factors at a given standard, the writer has found that a hot-spot which has an effective area twice that of the carburetor throat is sufficient to "fog off," by impact, the heavier fractions of the fuel, which otherwise form the undistributable portion of the charge. (By "fog" is meant that state of disintegration in which the fuel is not vaporized or expanded, but is nevertheless amenable to simple air flow.)

It is found essential to keep the rest of the surface of the inlet manifold as cool as possible, even, in some cases, going to the length of increasing its distance from the cylinder block.

Where the above requirements are properly met, this system, simple as it appears, enables a high degree of flexibility and low speed torque to be obtained, without in any way sacrificing power at the peak of the load.

This method, of course, is a complete acceptance of the theory of destroying a cumulative cone of fuel globules by means of an impact hot-spot, which theory, the writer feels, is too well known in America to call for comment.

A modification of the layout shown in Fig. 1 appears in Fig. 2. In this case the hot-spot is also integral with the exhaust manifold, but is formed with a circular core at its bottom end. This is bored out, and the inlet manifold arms are inserted. This variation is, if anything, rather more extreme in its action.

It cannot be too strongly emphasized that, when dealing with small, really high-duty engines, the utmost care is essential to avoid any rarefaction of the charge. One well-known six-cylinder car, with an inlet manifold similar to that of Fig. 1, fulfilled all the designer's requirements until subjected to a really hard endurance test. Then it fell away badly. The writer carefully examined the whole inlet system but in every way it conformed to the specified limits. Mechanical and ignition faults were sought, but eventually it was discovered that, under the conditions mentioned, the front three cylinders showed distinct loss of power. A forward off-take from the exhaust manifold, passing down in the same vertical plane as the inlet manifold, was overheating the front of the latter, thus upsetting the mixture equilibrium in the oscillation pipe.

Provision of generous sized louvers in the hood improved matters very much, but a rear off-take for the exhaust pipe would have proved the real solution.

Wherever possible, the riser is cut down to a mere flange. In any case it must cause a certain amount of wall-distillation, which is highly undesirable. The idea that a riser assists high-speed power output by causing a piling up of mixture behind the closing inlet valve (a ramming effect) is true only in theory; in practice the carburetor would have to be at least below the crankshaft level to obtain any effect whatever from this influence.

The elimination of the riser precludes completely the use of any heating system akin to that shown in Fig. 3. Research has indicated that heat applied at this point must be very intense indeed, and effective over a large area, to be of material benefit. The time factor has such an important effect upon any arrangement of this kind that stability of results for varying gas speeds and manifold depressions is difficult to obtain. The writer holds that the heating effect on the charge, during its passage through a heated chamber, is likely merely to cause fractionation. It is hardly reasonable to suppose that all the heavier and larger globules of fuel spray make at once for the walls of the riser on leaving the carburetor throat. In this case, the heat has effect also on the finely fogged, lighter fractions, which do not require it. Per contra, such heavy fractions in mid-stream as require treatment receive practically none.

An impact hot-spot, on the other hand, deals only with the charge content which, by reason of its undivided state, has sufficient inertia to reach the hot surface, and which is, of course, the only portion causing difficulty.

For such reasons, all forms of the general arrangement indicated in Fig. 3, whether exhaust or water-heated, fail to give sufficient uniformity of action. It is certainly easy to construct, since, in practice, the

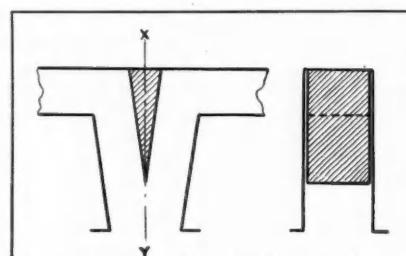


Fig. 7—Usual form of tongue with induction manifold rectangular in section. Right-hand view is cross section on line X-Y

oscillation tract is superimposed, and the riser passes through the exhaust manifold, which forms a ready-made heating chamber.

The high frequency of the reversals of mixture flow in six and eight-cylinder engines across the header (see Fig. 4) has led to the numerous experiments in the use of baffles, tongues, etc.

The partial baffle, which, by some people, is still held both to damp out pulsations and to act as a guide for in-going mixture, is regarded by the writer as purely pernicious. It is shown in diagram form in Fig. 5. As far as one can judge from a theoretical consideration of the layout, the triangular baffle merely serves to divert a backward traveling pulsation down into the throat of the carburetor, there converting what should be a uni-directional flow into a state of agitated and uncontrolled whirling. The effects observable from a trial of this system bear out the foregoing in every detail.

A modification is shown in Fig. 6. The peculiar shape of the baffle appears to act as quite a useful damping device without an appreciable action on the header portion of the manifold. Incidentally it can be of large size without causing restriction. Its shape and size have to be determined experimentally, and therefore it must be classed, at this stage of knowledge, as a somewhat unknown quantity. In such cases as demand a separation device with a single carburetor, the tongue, or breeches piece, formed into a short header as in Fig. 7 is most usual. This does at least insure the uni-directional end feed which is so desirable, without the complication and expense of a dual carburetor.

The exact design of a tongue or bridge is of the very first importance. Hitherto the normal procedure appears to have been to utilize a dividing tongue ending in a horizontal face at an arbitrary distance from the induction flange and carburetor efflux. Fig. 8 sheds interesting light on this point. It shows the power curve *A* of a given engine, which is carbureted with a breeches pipe and a tongue of the type just mentioned.

Careful experiments were conducted, as free from observational errors as possible, with the bridge or tongue terminating at varying heights above the carburetor outlet. It was definitely found that the power curve varied in sympathy, virtually rotating about a pivot point approximately half way up the r.p.m. scale. Thus, curve *C*, with the tongue edge raised considerably, put up the peak b.h.p. but caused a sacrifice of power at low r.p.m. Conversely, another alteration of the tongue, causing it to extend nearer to the carburetor, caused a sacrifice of power at high r.p.m.

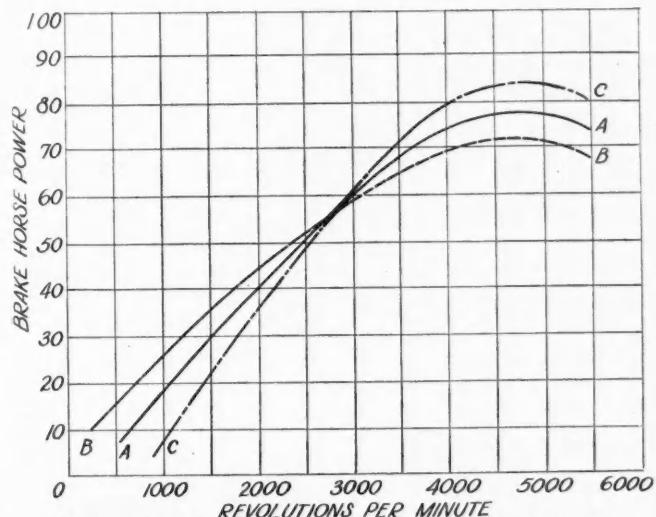
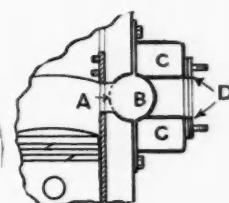


Fig. 8—Variations in power curves following alterations in length of tongue in riser

Fig. 9—Sectional diagram of manifold heating for six-cylinder single-sleeve-valve engine. *A*. Portion of manifold cast with cylinder block. *B*. Manifold section bolted to block. *C*. Exhaust-heated box cast with manifold. *D*. Flange for horizontal carburetor



retor, had exactly the opposite effect, as indicated by curve *B*. The variation in the structure of the power curve was found to be directly proportional to dimensional alterations in the length of the tongue.

The variable which caused these results was obviously the sudden increase in area of the mixture tract between the point where it joined the carburetor throat and the beginning of the tongue piece. This led the writer to consider some means of so constructing the tongue that an approximately constant area might be obtained, right from carburetor flange to the oscillation tract. This was accomplished, and the results fully justified the experiments, since the best sections of curves *B* and *C* were found possible of combination. The writer is not, however, in a position to give details of this construction until a later date.

It will be well to interpolate here that, where the writer has referred to the term risers or headers, it should not be taken to apply exclusively to the use of vertical carburetors. The use of a horizontal carburetor incorporating a horizontal intake analogous to the riser of a vertical carburetor is largely subject to the same remarks.

The use of the "breeches," or bifurcated, oscillation tract is by no means isolated, although it is generally confined to engines designed under the aegis of Ricardo. The methods of hot-spotting mentioned previously are quite applicable, the area of the "spot" being increased to handle the mixture in both tracts.

Incidentally, although the virtue of a bifurcated inlet tract—as distinct from a bifurcated riser—is commonly supposed to be the prevention of interference between port and port, more especially at high engine speeds, the writer has found its greatest benefit to lie in the fact that it renders possible the use of quite weak mixtures at low engine speeds, without the popping back in the inlet tract which normally occurs under these conditions.

Heating methods may be divided into four classes: (1) Hot-spotting, (2) exhaust heating, (3) water jacketing and (4) preheated air.

1. *Hot-spotting*. This scheme has already been considered, and is certainly the favorite in British and Continental practice.

2. *Exhaust Heating*. Some types of hot-spotting might almost be classed as exhaust-heated systems, the diagram shown in Fig. 2 lending point to this suggestion. Mainly, however, it is an exhaust box integral with the manifold, and fed by piping, which is classed under this heading. It is found advisable only where constructional difficulties preclude the employment of a contact hot-spot. One such example with which the writer had to deal recently was a six-cylinder single-sleeve valve engine, in which the exhaust manifold was on that side of the cylinder block remote from the inlet ports. The inlet manifold itself was formed by *a*, a semicircular channel in the block (from which the ports were fed) and *b*, a plate with a semicircular channel along its length, bolted to the block face. By using a horizontal carburetor, and casting a heater box around

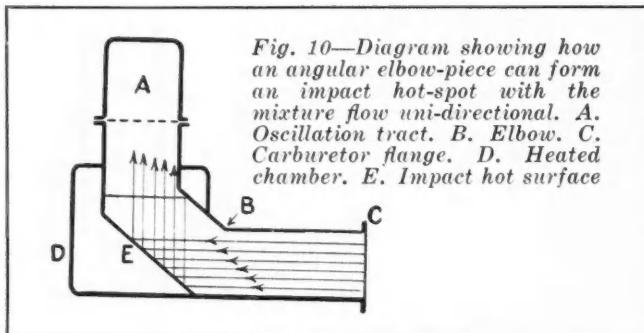


Fig. 10—Diagram showing how an angular elbow-piece can form an impact hot-spot with the mixture flow uni-directional. A. Oscillation tract. B. Elbow. C. Carburetor flange. D. Heated chamber. E. Impact hot surface

the junction of intake and oscillation tract, the necessary points for heating were isolated. Pipes of large diameter (to avoid clogging) lead to and from the box, the one admitting the exhaust gases from the manifold being specially positioned to cause a species of impact by the hot gases upon the "T" of the inlet pipe.

This layout was completely successful in giving an excellent performance, despite the absence of the hot area provided by a mushroom or poppet valve, and the unavoidably exiguous shape of the inlet passages. A diagrammatic section of the arrangement is shown in Fig. 9. When this scheme in general was found to be satisfactory, the cylinder block was modified to allow the exhaust feed pipes to pass through the cylinder block and thus be invisible, a plan, which, all unknown to the writer, was at the same time being adopted for the big Duesenberg car introduced at the end of last year. It was found to be essential to provide an air insulating passage between the feed pipe to the heater box and the circulating water. Otherwise the heat loss en route seriously upset matters.

3. *Water Jacketing.* Water jacketing is dying out. It survives only on those large and luxurious vehicles for which a paid driver is a sine qua non, and to whom a lengthy warming-up period is of little or no importance. Its only virtue would seem to be a complete and steady uniformity of temperature within quite narrow limits, but its deficiencies, for average or extreme purposes, are patent. Further, the increasing use of thermostatic control of water circulation is proving an added obstacle to its employment. What has been said earlier about the fractionation effect of a long riser applies here with added force, since almost invariably it is the riser which is jacketed.

4. *Preheated Air.* Considering uncontrolled heating of the air as quite useless, there are left two systems, viz.: mechanical and autostatic air-temperature control. The former generally involves the use of a muff surrounding the exhaust pipe, a lead to the carburetor air intake, and some form of control valves. The system is more or less complicated and not very satisfactory. Often the muff restricts the air flow, while the control, if direct by hand, is subject to abuse and neglect, or, if mechanical, is of a complicated order.

Autostatic control, developed in England by Whatmough, will be familiar to all automotive engineers in America. In theory the system is good, though it needs individual experiment to suit it to a given layout, and must be accurately matched to the degree of spraying provided by the carburetor. Again, although it takes

no cognizance of those two unknown variables—mixture speed and inlet pipe depression—it is likely that a useful mean can be decided on for the in-going air temperature. The system is in its infancy, and, whatever may occur in the future, at present the hot-spot system, designed with meticulous regard for the performance required, is found on the great majority of European cars.

Considered in the light of applied physics, it seems advisable to effect all spraying, disintegration, etc., before the mixture reaches the oscillation tract. In this way, a stable and more or less uniform mixture would be undisturbed by considerations other than those purely of distribution in its strictest sense. A more uniform feed to each inlet port would automatically follow.

In this case all hot-spotting must, of course, be done prior to the oscillation tract, and must be more complete than the hot-spot of Fig. 3 can provide. To obtain anything approaching the manifestly desirable impact type of hot-spot is not easy. The use of a horizontal carburetor and two 45-deg. bends, as shown in Fig. 10, is one method. The elbow portion must be of ample area, and the 45-deg. bends must be made as shown in Fig. 11, and not by merely "slicing" off the corner and leaving a bend of the shape as shown in Fig. 12.

In Europe the open carburetor is supreme. Due to that characteristic of the user which prompts him—or

even her—to "adjust" anything that is adjustable, we have rigorously to exclude all such convenient aids as plungers, needle-valves, thermostats, etc., and to obtain results by very precise well control and mixture correction. Two examples will serve to indicate the type of problem to be tackled.

A was a small engine of just over one liter capacity and four cylinders. Its compression ratio was 7.0 to 1 and it had to reach the peak of its power, which was over 45 hp. at 5300 r.p.m. At the same time it had to be reasonably smooth and flexible. Its maximum

speed was approximately 76 m.p.h. and it had to accelerate from 5 m.p.h. on top gear without stagger or miss. This was accomplished by using two carburetors on a common tract, each with a choke diameter of 23 mm. (0.905 in.), less diffuser.

B was a straight-eight of under two liters capacity. To obtain the required performance, the writer found it necessary to recommend a choke diameter of no less than 28 mm. (1.102 in.), less diffuser. Even with this, smooth and brisk acceleration was obtained from a top-gear speed of 3 m.p.h.

Six and eight-cylinder engines (when fed from a single carburetor) will perform well with a mixture correction curve of a much lower order than will fours. The question of overlap of depression p-e-

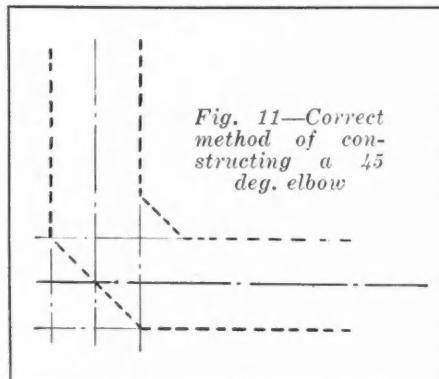


Fig. 11—Correct method of constructing a 45 deg. elbow

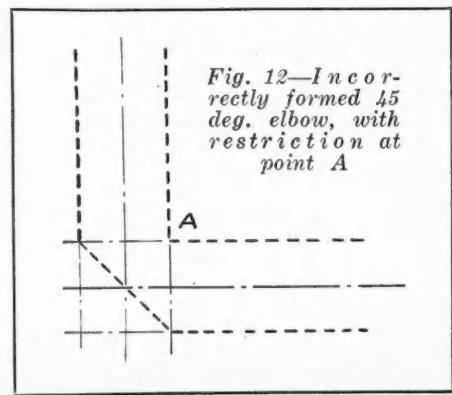


Fig. 12—Incorrectly formed 45 deg. elbow, with restriction at point A

riods, and the resulting continuous, if varying, drag at the jets largely account for this. But for the fact that it is possible to carburet a six-cylinder engine so that the intermediate mixture strengths are decidedly weak, the consumption figures would be very bad.

A point which demands more general recognition is the sensitiveness of six or eight cylinders to the degree of spraying. With this is bound up the question of obtaining good torque maintenance at low r.p.m. In the writer's experience, it remains a moot point as to how far the requisite degree of disintegration should

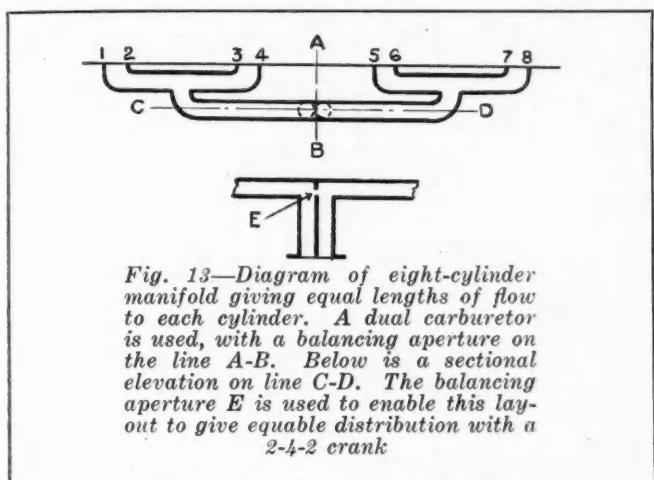


Fig. 13—Diagram of eight-cylinder manifold giving equal lengths of flow to each cylinder. A dual carburetor is used, with a balancing aperture on the line A-B. Below is a sectional elevation on line C-D. The balancing aperture E is used to enable this layout to give equitable distribution with a 2-4-2 crank

be performed functionally in the carburetor, and how far in the manifold.

One still quite frequently hears the expression that a certain carburetor "is not suitable" for a certain engine. It would appear that this is a stumbling block to carburetor designers. It should be axiomatic that the degree of spraying—apart altogether from the gasoline-air ratio curve—should be a function of inlet pipe and inlet port heating. A naturally hot engine with an overheated tract will pink or knock and exhibit deplorable tendencies on any mixture but a coarse one.

Similarly, at the other end of the scale, smoothness and sweetness are maintained on a cool layout by providing good spraying facilities.

After all, the production of a required mixture texture is an involved problem, subject to many variable influences. Nevertheless, it would seem that, until carburetor designers more generally provide means for obtaining any required texture, their products will be termed suitable only for some engines.

In six-cylinder engines the firing order 1-5-3-6-2-4 is almost universal in British and Continental practice. To the carburetor engineer it is the best, for either single or dual instrument. In the former case it gives a less evil effect to the pulsational reversals, while with a dual carburetor the conversion into two three-cylinder engines also includes "outward firing," by which is meant that the two sets of cylinders fire outward, and the reversal at the end takes place with a full pipe. The use of the 1-4-2-6-3-5 firing order entails inward firing and reversal in an empty pipe, and is consequently not employed with a dual carburetor. The writer inclines to the view that reversal in an empty pipe cannot but cause weakness of the first cylinder to fire afterward.

End feed is confined to one or two engines, and it is difficult to find any real justification for its use with one tract, as distinct from a dual tract layout, unless two carburetors are fitted, one at each end, with a common discharge. In passing it will be noted that the

Napier-Lion airplane engine, as used by Capt. Malcolm Campbell and Major Segrave in their racing cars, utilizes end feed to each of its three banks of four cylinders. In this case the reason is constructional, and each manifold tapers toward the remote cylinder, the effect aimed at being obvious.

Eight-cylinder engines of the Panhard and Isotta-Fraschini type, which use a 4-4 crank, need little consideration. They are, from a carburetion standpoint, merely two four-cylinder engines, end to end. Be it noted that the occasional complaint of roughness in large engines of this order is not due to crank layout. The reason lies in the extremely high power output which they give all the way up the r.p.m. scale.

The now general use of the 2-4-2 crank layout makes successful carburation a problem. A carburetor to each adjacent pair of cylinders inevitably causes richness in that cylinder which fires after the shorter interval, as indicated by black smoke in the exhaust. The Leyland-Thomas racer, used by the late Parry Thomas, was always carbureted this way, and spectators at Brooklands with only slight technical knowledge often remarked that his engine was "running rich." Actually it was necessary to make the one cylinder of each pair rich to avoid weakness in the other. But the fuel consumption was appalling.

The remaining solutions seem to be (a) the single carburetor, which is difficult to handle on any but the smallest engines without sacrifice of m.e.p. at high r.p.m. and (b) the dual layout, which was, the writer believes, popularized in America by Stutz, and provides separate feeds for the four center cylinders and the two end pairs.

The latter arrangement, it seems, is open to the grave charge of making the engine rough. The unequal lengths of the two oscillation tracts result in unequal critical wave lengths. Thus at low speeds, one set of four cylinders does more effective work than the other. As the r.p.m. rise, a point is reached where both tracts are in phase and at this point a smooth flow of power is obtained. Beyond it, the other four cylinders, previously laggardly, now obtain more efficient carburation, while the first four tail off. Thus roughness due to unequal torque from each set of cylinders again supervenes. To obviate this by making both tracts of equal length introduces constructional difficulties not easy to overcome.

One rather unusual layout, used quite successfully, is shown in Fig. 13. This consists of a dual carburetor feeding from each choke way to the four right-hand and left-hand sets of cylinders respectively. This engine has a 2-4-2 crank, but the unevenness which such a layout would normally produce is nullified by a carefully determined balance orifice in the wall between the halves of the tract. This system avoids the roughness caused by the unequal pipe lengths referred to above.

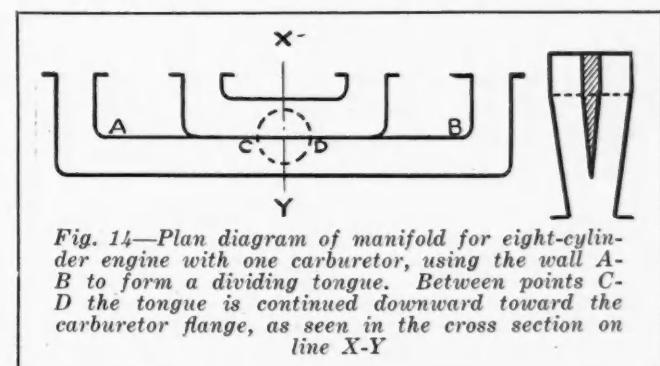


Fig. 14—Plan diagram of manifold for eight-cylinder engine with one carburetor, using the wall A-B to form a dividing tongue. Between points C-D the tongue is continued downward toward the carburetor flange, as seen in the cross section on line X-Y

and apparently even distribution is effected.

The use of a transversely split intake and tongue, as shown in Fig. 7, should obviate the lack of pulsation control which obtains with a single carburetor on an eight with a 2-4-2 crank. The writer has not yet been able to test this layout sufficiently to give any opinion, but it would appear that, if the division is complete enough to damp pulsations, the peculiar spacing of the firing points, in terms of crank revolutions, which are present in either bunch of four cylinders, will result in interference as between Nos. 5 and 8, and Nos. 1 and 4.

The better method appears to be the location of the tongue or division in a plane parallel to the crank, thereby converting the manifold into a dual one feeding respectively the center four and two end pairs of cylinders, but from one carburetor. This is shown in diagram Fig. 14 and has much to recommend it, although the unequal critical wave-length problem remains.

It may sound heretical, but so far there appears to be little excuse for the straight-eight engine except for cars built solely for speed. Apart from the very first few revolutions during acceleration from stalling speed, it does not seem to give any added smoothness or extra acceleration, while the writer knows of no eight-cylinder engine which, size for size, gives a maximum b.h.p. equal to that of a six-cylinder one. This is, perhaps only to be expected, in view of the manifest difficulties of devising a really sound system of manifolding.

The firing order of the 2-4-2 crank type has apparently settled down to 1-6-2-5-8-3-7-4. Regarded in the light of a dual carburetor, this gives the undesirable "inward" firing, but any order giving outward firing unfortunately causes succeeding power impulses on adjacent crankpins at least once every revolution.

An examination of the pulsation reversals across the header of a single carburetor with the firing order just specified shows that, twice during each complete cycle, such reversal stops and is replaced by a pulsation to the end cylinder in each case. Thus 8 fires after 5, and 1 after 4. In these circumstances it seems impossible for mixture distribution from a single carburetor and straight manifold to be anything like so accurate as in a six-cylinder engine using a 1-5-3-6-2-4 firing order.

Importance of Valve Timing

One or two European makers, and at least one English firm, have experimented with unusual crank layouts for a straight-eight but these, while giving good results from the distribution standpoint, brought in undesirable vibration periods which the 2-4-2 style avoids.

It is surprising to note that there are still some designers who lack a proper appreciation of the necessity for suiting the valve timing to the manifolding system. One finds an engine produced and tested with both single and dual layouts, using the same camshaft. Yet a little consideration shows that, with six or eight cylinders, timings can be successfully used which

possess a great deal of excess overlap and opening period for any smaller number of cylinders. To obtain maximum results from a six-cylinder engine with a dual carburetor its valve timing must be evolved as for a three-cylinder one, and for an eight, as a four-cylinder engine; to use a normal four-cylinder timing on a six or eight with one carburetor and no breeches piece is to throw away opportunities. In the same way, the subdivision of the engine into virtually two units by fitting a dual manifolding system at once permits a modification of the degree of hot-spotting needed.

The present vogue of vacuum operation for numerous accessories and servo braking hits the European carburetor designer rather badly. Bearing in mind the fact that he has to budget for operation at much less intense manifold depressions than his American confrere, it will be realized that the robbery these accessories perform can, in the aggregate, be serious. On the other hand, the increasing use of coil ignition has considerably lightened his burden by virtue of its superior starting and low speed characteristics.

Auxiliary Blower a Possible Development

A possible trend of development takes the form of an auxiliary blower, so small as to be hardly an instrument worthy of that name but large enough to maintain a pressure just over atmospheric in the manifold under the most adverse conditions, and designed to come into action automatically when the inlet-pipe depression reaches the point where carburetion becomes unstable. The writer favors the idea that it will have to be of the type which blows through the choke tube, though to what pressure one may aspire without pressure balancing devices, he has yet to determine accurately. It is probable that sufficient pressure for the purpose can be obtained without resorting to those undesirable complications. Certainly it seems that only in this way can a small auxiliary be used, and—what is equally important—a reasonably sized choke tube, too.

Another helpful factor is the theory of Dr. Watson that a spark plug situated in too cool a position requires an immensely raised voltage to cause it to spark across the gap. The resulting strain culminates eventually in the breakdown of the ignition system. In this theory may lie an explanation of that very elusive misfiring, hitherto ascribed to carburetion, which occurs with certain engines.

Another factor of which cognizance should be taken is the Whatmough design of cylinder head combined with valve and spark plug disposition. This is not only interesting, but, in view of the supposed behavior of flame travel when converting a monoxide into a dioxide, is of importance in carburetion.

In conclusion, the writer would like to hear of any conclusive findings that have been obtained from the study of manifold mixtures in a glass tube, through the use of an oscilloscope or other luminous interrupter mechanism.



Marmon Presents the Roosevelt As Lowest-Priced Eight

**Car Has L-Head Engine of 202
Cubic Inches Piston Displace-
ment and Compression Ratio
of 5.25 to 1. Reorganized
Plant Makes Possible
Price of \$995 F.O.B.**

By
Athel
F.
Denham



*A view for visualizing the lines of
the new Roosevelt*

ONLY a few years ago the eight-cylinder car occupied the extreme upper end of the price range for passenger cars, but a large number of new eight-cylinder models have appeared during the past two years and the figure for the "lowest-priced" eight has come down lower and lower. Now the Marmon Motor Car Co. is announcing a new car known as the Roosevelt which lists at \$995 and is the first eight-cylinder model to sell below the thousand-dollar mark.

The Marmon company is now confining its activities entirely to the production of eight-cylinder cars. During the past few years it has completely reorganized its production facilities and it now claims to be in position to produce eights in all price classes with a minimum of overhead expense.

As an example of the lines along which economies have been effected it is pointed out that cylinder blocks for several different engines can be run down

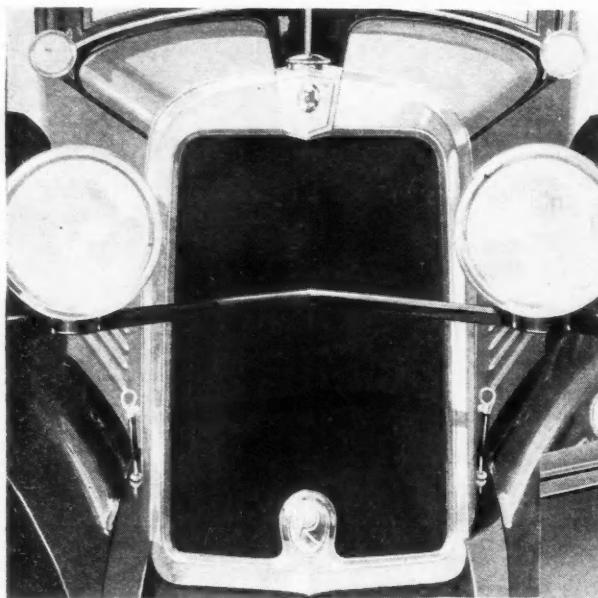
the same production line. This is made possible by using identical cylinder spacings, so that a change in the reamer or hone size will take care of the difference in bore.

Thomas J. Little, Jr., chief engineer of the Marmon company, is largely responsible for the present line-up of production facilities. "We intended to build a car at less than \$1,000," said Mr. Little to the writer, "and it was a question whether it should be a six or an eight. After considerable study we found that there is little difference in the cost of manufacture of a six and an eight of equal power, and especially was this so in our case, as we already had the multiple spindle machinery for the production of eight-cylinder blocks.

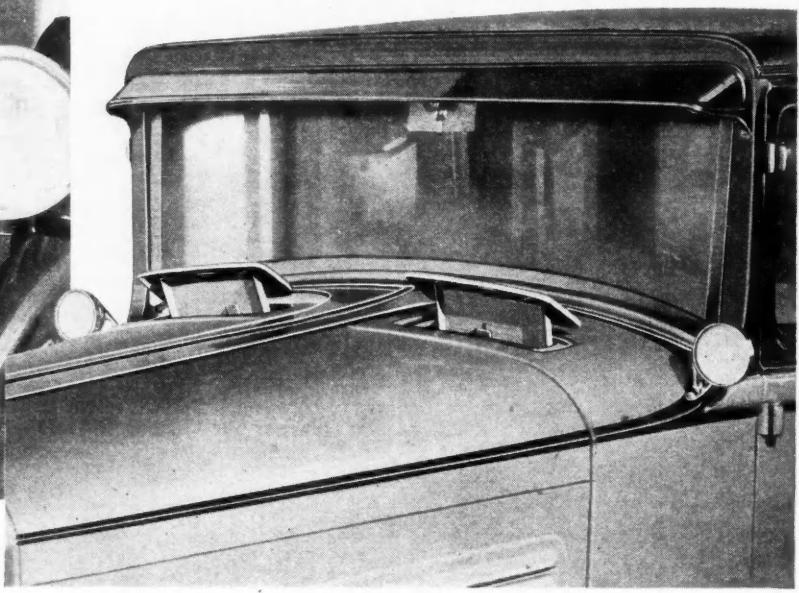
"The old Marmon policy of building custom-quality cars led to a system of close manufacturing tolerances. In this respect the company was particularly fortunate when it decided to enter the lower price ranges with large quantity production,

Mechanical Specifications of the New Roosevelt

No. of cylinders	8
Bore and stroke	2 3/4 by 4 1/4
Piston displacement	201.9 cu. in.
Rated horsepower	72 at 3200 r.p.m.
Compression ratio	5.25 to 1
Engine suspension	4 pt. rigid
Main bearings	5
Valve arrangement	L
Camshaft drive	Chain
Temp. control	Thermostat
Fuel feed	Vacuum
Battery capacity	100 amp.-hr.
Clutch	Single plate
Transmission	Three-speed
Rear axle	Semi-floating
Ratio	4.9 to 1
Brakes	Two-shoe internal
Steering gear	Cam and lever
Springs	Half elliptic
Front springs	37 by 1 3/4 in.
Rear springs	54 1/8 by 1 3/4 in.
Overall length	172 in.
Wheels	19 in., wood
Tires	29 by 5.00



The monogram of the car bears a likeness of the late Theodore Roosevelt after whom it was named. Note the initial on the escutcheon over the emergency crank aperture



as close manufacturing tolerances are a prime essential in mass production at a low cost."

As to the car itself, it has a fairly conventional L-head eight-cylinder engine of 202 cu. in. piston displacement, and a rather high compression ratio of 5.25 to 1. It has a single-plate clutch, a standard three-speed transmission, a semi-floating rear axle, two-shoe four-wheel brakes, and a cam and lever steering gear. The overall length is 172 in. Initial production of the Roosevelt, according to G. M. Williams, president of Marmon, is to be around 200 cars per day.

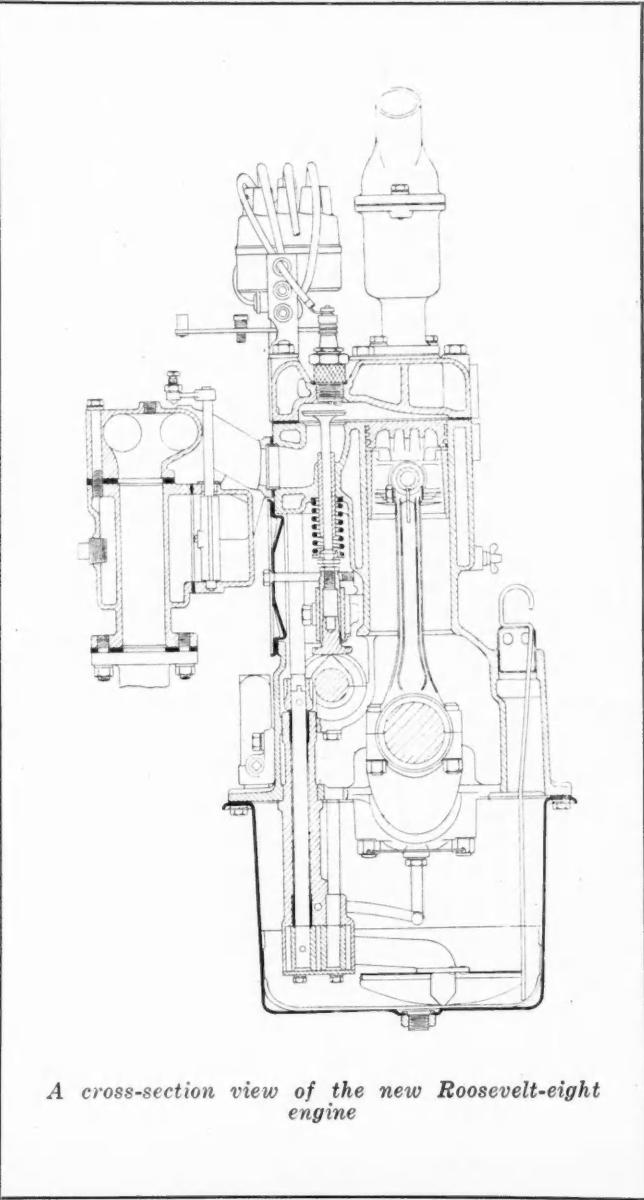
In appearance the car is characterized by a distinctive radiator shell and by full length belt moldings. Special features of its design are the Marmon high-frequency oscillating modulator, found on other Marmon cars, and designed to eliminate torsional vibration, and a single button control on the steering wheel to operate the lights, starter, motor and horn.

While actual weight figures are not available it is claimed that the engine weighs less per horsepower than engines of many other cars in the same price class. A study of the engine shows that considerable research has been done on individual sections with a view to reducing weight. While this appears to be a rather costly procedure, especially for a car priced as low as the Roosevelt, the resultant saving on material costs should soon offset this expense, while the reduction in weight improves the performance.

The five main bearings which support the 2 1/8-in. crankshaft have a total length of 7 1/4 in. There are no counterweights, but the Marmon torsional damper is fitted. The crankshaft is drilled for crankpin lubrication, and holes drilled in the connection rod lower ends help in cylinder wall, piston and wristpin lubrication. Big end bearings are spun in and finished by diamond boring. Pins are locked in the rod and bear directly in the aluminum alloy Permite pistons.

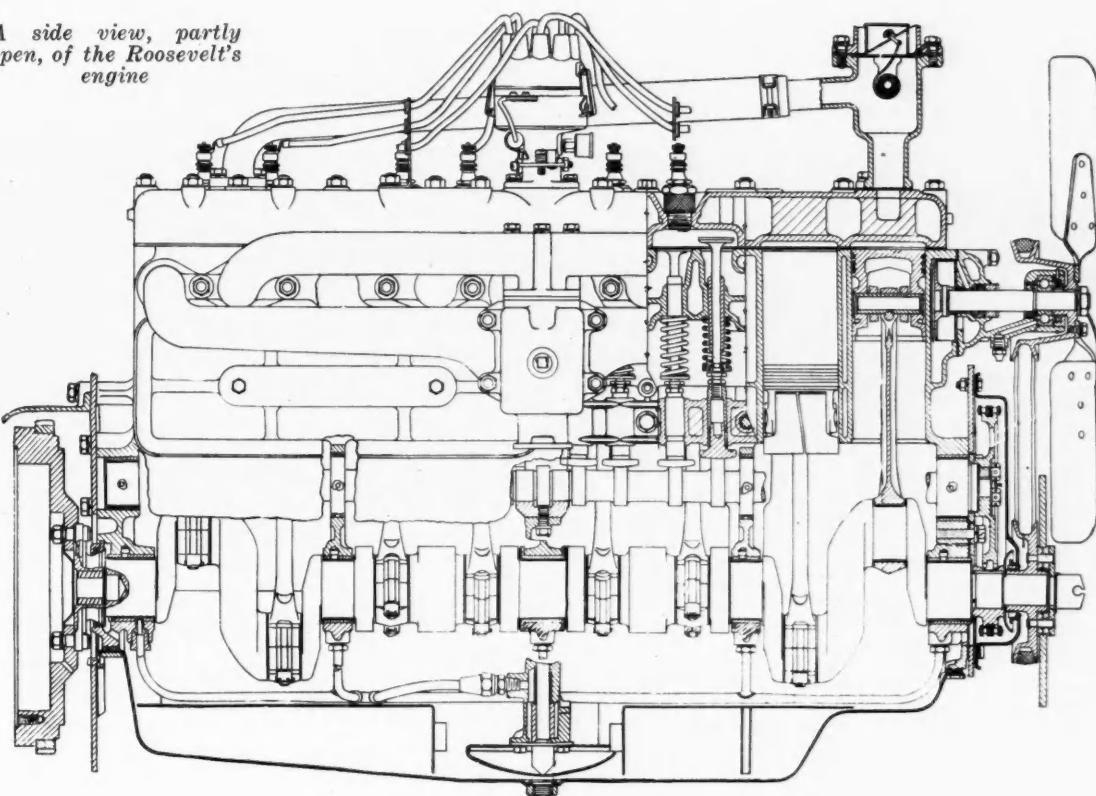
These pistons are of an unusually hard, heat-treated alloy of aluminum, iron and copper. It is stated that the general run shows a hardness of 160 Brinell, which compares well with many cast-iron pistons. All three rings, including the oil control ring, are above the pin, as usual in struttet-type pistons.

Inlet valves are of No. 3140 S.A.E. steel, and exhaust



A cross-section view of the new Roosevelt-eight engine

A side view, partly open, of the Roosevelt's engine



valve heads of silchrome. Combustion chambers are of a so-called semi-Ricardo type with the spark plug closer to the inlet than the exhaust valve. Camshaft drive is through a double roller chain. Since the camshaft only is driven by this chain, which is therefore of small length, no adjustment is provided. Fan, water pump, and generator drive is by means of a V-belt, the generator mounting furnishing the adjustment and the fan and water pump being in one unit.

Special attention has been given to cooling. Thermosyphonic circulation control is provided, and sufficient clearance is permitted around the pump impeller blades to permit of a thermosyphon cooling action in case of pump drive failure. Large water jackets are provided around the cylinder barrels and valve stem guides. The capacity of the system is $5\frac{1}{2}$ gal.

Fuel feed is by means of a vacuum tank from a 14-gal. tank at the rear, to a $1\frac{1}{4}$ -in. carburetor of the plain tube type. Spark plugs are $\frac{7}{8}$ in. size and a single breaker distributor is used.

The rear axle gear ratio is 4.9 to 1, which with 29 by 5.00 tires gives a road speed of 57 m.p.h. at 3200 r.p.m.

Springs are semi-elliptic all around and are designed to take both torque and drive reactions. They are mounted in self-adjusting spring shackles. With its overall length of 172 in., and 14 to 1 ratio cam and lever steering gear, the car has a turning circle diameter of 36 ft.

Frames have a channel depth of 6 in., with 2-in. flanges, and $\frac{1}{8}$ in. stock. Two-shoe internal brakes are found on all four wheels. The emergency lever operates the same set of four-wheel brakes.

Bodies are of composite wood and steel construction, with steel running boards. Cowl lights are mounted

close to the body proper, on top of the cowl. Windshields are of the swinging type. All exterior hardware is chrome-plated. Two cowl ventilators are mounted on the top of the cowl, each being independently lever-operated.

Interior finish and fittings incorporate such items as broadcloth upholstery, two-tone hardware, grouped instrument panel mounting a dash gasoline gage in addition to other instruments, and an ignition lock grounding the coil, the latter being attached to the back of the instrument board to prevent "jumping" of the coil on the part of thieves.

A LITTLE book on *Omnibus Lighting and Starting* has been issued by The Fanfare Press, London, England. It is a reprint of a series of articles by J. W. Houghton in *Motor Transport* and deals with such subjects as the relative merits of third brush control and constant voltage control, the choice of generators for various bus services, the principle of double-voltage generators, etc. The scope of the work is rather narrow, however, in that generators, starters and accessories of one make only are referred to.

WESTINGHOUSE ELECTRIC & MFG. CO., as in previous years, has published a pamphlet dealing with its engineering achievements during the past year. While the list is a very imposing one all of them are outside the field of road transportation except a trolley bus built for Salt Lake City. A good many, however, are in the field of rail transportation and one deals with gas-electric industrial locomotives.

How Stutz Budgets Its Activities Almost to the Day and Dollar

Without the use of any special forms, this manufacturer has been able to predict his income and expenditures to a degree of accuracy that is exceptional.

By L. A. Baron*

Comptroller, Stutz Motor Car Co. of America, Inc.

THE first step in the make-up of our budget is for the management to give us our "problem or assumption." In other words, the management must tell the organization how many automobiles we can expect to sell over the budgeted period. This forecast or problem is the basis on which the accounting department works in making up the budget.

The management must not only predict sales, but it must also predict what the profit shall be. This is a figure which is set at a certain per cent of our gross sales. With the management predetermining what our sales and profit should be, we can safely say that we can only spend so much money to produce and sell the product.

The management having given the accounting division a prediction of sales by months and by models, it is an easy step to convert it into income for each month and for the budgeted period as a whole. A production and shipping schedule to comply with the sales forecast is worked out.

For budget purposes we consider our processing time at approximately 10 days, and 25 working days for the month. If the factory is working smoothly, this means that each day we should produce on the final line 4 per cent of our total monthly quota. Not later than the 18th of the preceding month, we would have had to start the production of certain units to meet this 4 per cent.

*This article is a digest of a paper entitled "Manufacturing Budgets" read by Mr. Baron at a recent meeting of the Detroit Chapter of the National Association of Cost Accountants.

To meet a production and shipping schedule of this nature, it is necessary to have 90 per cent of our parts in the plant at least 10 days before they are to be converted into a completed car ready for the dealer or consumer. It is up to our production and purchasing departments to arrange their purchasing of materials to meet the production schedule that will tie in with the sales forecast.

Forecasting our expenditures is the next step, and it is the one that requires the greatest amount of work from the accounting department. These expenditures are broken down into productive materials, productive labor, commercial expenses and the different manufacturing expenses.

Past experience gives a working figure for our material and labor costs. As materials are purchased to meet production schedules, it is fairly easy to predict payment dates for this item; the same can be said for productive labor.

Our expenses are divided into two classes. Commercial expenses and manufacturing expenses.

Under commercial expenses we make up three schedules, as follows:

1. Administrative Expenses.

2. General Office Expenses.

3. Sales and Advertising Expenses.

Under manufacturing expenses we have five schedules, as follows:

1. Direct Manufacturing Expenses.

2. Fixed and General Expenses.

3. Purchasing Department Expenses.

A Stutz Budget Forecast

1—Sales

Total number and type of cars to be sold.

When they will be sold.

2—Income

Amount of income.

When it will be realized in cash.

3—Production

Quantities of each product to be made.

When they will be made.

4—Expenditures

For materials, labor, supplies, expense and equipment.

When it will be paid out in cash.

5—Profits

Amount.

When it will be realized.

6—Financial position

Amount of financing necessary.

When it must be provided.

When it can be liquidated.

4. Engineering Department Expenses.
5. Service Expenses.

Each of these schedules is a breakdown of the different items of expense applicable to the proper schedule, such as salaries, supplies, traveling expense, scrap labor and material, depreciation, rentals, maintenance, etc. There are a total of 135 different items on these several schedules. Some of the items, such as salaries and supplies, are applicable to several of the schedules, while many of these items, such as scrap losses or depreciation, apply to one schedule only.

Each item of expense on each schedule is forecast for each month for the year. Each schedule is totaled for each month and each item of expense on each schedule is cross-footed for the year. The schedules are balanced by cross-footing the monthly totals and totaling the yearly total of each item.

In making these different schedules of expense the departmental heads, who are held accountable for the administration of the different schedules, are freely consulted and they are given every opportunity to write in their own version of a budget. Being in complete charge of their own departments, they naturally should be able to foresee certain expenses which the accounting department would at this time know nothing about.

They possibly have in mind certain increases which they wish to make in the salaries of their employees, or certain operations which they contemplate carrying on. All such items are written into the budget under their proper headings, and in the month in which the departmental heads expect these changes to occur.

The make-up of our Direct Manufacturing Expense schedule requires more care and detail than all other schedules combined. To make up this schedule, we predict the expenses by departments. By an analysis of our direct labor costs, we determine the percentage of direct labor per car for each of our manufacturing departments. By comparing the total payroll of each manufacturing department to the total productive labor in each department we are able to get the total departmental payroll ratio to productive labor.

Assuming that our analysis shows us that for a certain department our productive labor is \$10 per car and our total payroll is 125 per cent of the productive labor, this would give us a payroll cost of \$12.50 per car for the department. Assuming that our schedule for any month in this department called for 1000 units, we can safely predict that our payroll for the department for the month will be \$12,500.

By analyzing the different expenses of this depart-

BUDGET PERFORMANCE							
MANUFACTURING EXPENSE							
STUTZ MOTOR CAR CO. OF AMERICA, INCORPORATED							
OCTOBER 31, 1928							
BUDGET MONTH	ACTUAL MONTH	MONTH SAVINGS	MONTH OVER	BUDGET CUMULATIVE	ACTUAL CUMULATIVE	CUMULATIVE SAVINGS	CUMULATIVE OVER
Indirect Labor							
General Supervision	2,568.00	2,345.00	223.00	25,680.00	23,450.00	2,230.00	
General Foremen	1,490.00	1,713.00		14,900.00	17,130.00		2,230.00
Dept. Foremen and Assistants	1,395.00	2,062.00		18,950.00	20,620.00		1,670.00
Production Control	1,275.00	1,126.00	147.00	12,750.00	11,260.00	1,470.00	
Time Study	675.00	718.00		6,750.00	7,180.00		430.00
Tool Design	1,253.00	1,026.50	226.50	12,530.00	10,265.00	2,265.00	
Employment & First Aid	300.00	325.00		3,000.00	3,250.00		250.00
Traffic	300.00	326.75		3,000.00	3,267.50		267.50
Timekeeping	875.00	659.00	16.00	8,750.00	8,595.00	160.00	
Cost and Pay Roll	2,150.00	1,912.25	248.75	21,500.00	19,912.25	2,487.50	
Watchmen and Elevatorman	612.50	592.65		6,125.00	6,926.50		798.60
Factory Clerical General	250.00	194.25		2,500.00	1,942.50	557.50	
Process Inspection	2,500.00	2,677.92		25,000.00	26,779.20		1,779.20
Receiving Inspection	950.00	873.38		9,500.00	8,733.38	766.20	
Final Inspection	1,000.00	1,028.75		10,000.00	10,287.50	212.50	
Tool Room Attendants	350.00	413.51		3,500.00	4,135.51		635.10
Store Room Attendants	1,388.00	1,107.82	280.18	13,880.00	11,107.82	2,801.00	
Receiving Room Labor	1,200.00	1,094.02	105.98	12,000.00	10,940.02	1,059.00	
Stock Handling	475.00	389.51	86.49	4,750.00	3,899.51	854.90	
Car Loading	1,575.00	1,399.20	175.80	15,750.00	13,992.00	1,756.00	
Firemen	520.00	470.80	49.20	5,200.00	4,708.00	492.00	
Sweepers and Janitors	625.00	719.97		6,250.00	7,199.70		949.70
Material & Labor Losses							
Salvage Expense	3,525.00	4,018.14		493.14	40,681.40	35,250.00	4,931.40
Material Losses	2,050.00	1,509.50	540.50	15,095.00	20,500.00		5,405.00
Labor Losses	960.00	1,071.86		111.86	9,600.00	10,718.60	1,118.60
Idle Time	150.00	31.63	118.37		1,500.00	316.30	1,133.70
Day Rate Guarantee	275.00	91.79	366.79		2,750.00	917.90	3,667.90
Manufacturing Supplies							
Waste and Rags	225.00	268.60		43.60	2,250.00	2,686.00	436.00
Oils and Greases	125.50	150.68		25.18	1,255.00	1,506.80	251.80
Gasoline and Kerosene	165.00	132.50	32.50		1,650.00	1,325.00	
Perishable Tools and Abrasives	1,725.00	2,136.53		411.53	17,250.00	21,365.30	
Electrical Supplies	200.00	195.98	4.02		2,000.00	1,959.80	40.20
General Shop Supplies	1,765.00	1,513.72	251.28		17,650.00	15,137.20	2,512.80
TOTALS	35,442.80	34,404.14	1,038.66		353,954.40	344,515.00	9,439.40

Exhibit Number One.

Herewith is seen a dummy of the Stutz direct manufacturing expense schedule as it is reported each month, showing the total performance

ment for the past six months we find our ratio of expense to each \$100 of payroll. This is done for each item of expense in the department. By multiplying the expected payroll per month by the expense rate, we arrive at a very satisfactory estimate of each of the variable expenses in each department for each month. By tabulating the expenses which appear in more than one department we arrive at the total for that expense for each month of the year. These tabulations are then written into our Direct Manufacturing Expense schedule.

After making up our several expense schedules we make our forecast of Other Income and Other Expenses. These schedules cover such items as discount earned, interest earned, returns from scrap sales, loss on bad accounts, interest on loans, etc.

Having predicted our income and expenses, we proceed to forecast a profit and loss statement, month by month. This is carried out in detail and includes all items which appear on our monthly Profit and Loss Statement. When this profit and loss budget is completed we know in advance what month should show a profit and which should show a loss.

One of the most important steps in our budget procedure is our budget financial forecast. This forecast sets forth the probable financial position of the company at the end of each specific month or period.

Two Schedules are Made

To predetermine our financing program we make up two schedules. The first is anticipated disbursements, which is a month-by-month detail of all expenditures for all purposes. This includes all expense schedules minus depreciation and other accrued expense but includes such deferred expenses from previous periods which will have to be paid out in cash during the budgeted period. Second is a financial forecast month by month. This schedule shows the cash balance at the beginning plus receipts and loans. The total is the available cash for disbursements. Total cash minus all disbursements and repayment of loans gives the cash balance at the end of each month.

To convert our sales into cash income is rather easy, as all of our cars are sold for cash, either certified check for drive-aways or sight draft B/L attached for all shippers. As these drafts are returned within an average of 10 days or less, we can safely say that on the 10th of any month the sales of the preceding month will be converted into cash and our income placed to our credit in the bank.

Our completed budget forecasts for us month by month our sales, our income, our production, our expenses, our profit or loss, our expenditures and our cash in bank. All of this work is done without the use of any special forms. The rough drafts or working papers are made up on standard 13-column analysis paper.

The budget in this form is passed on to our vice-president, who acts in the capacity of general manager. Naturally his first concern is to see that the total profit agrees with that profit which he had predetermined we would make on the yearly business. If the profit shown by this prediction is less than what he had contemplated the entire budget is revised. Each departmental head is asked to scale down his possible expenses at the points where it could be done to the greatest advantage. In this manner we eventually pull down our anticipated expenditures to the point which will show a profit in line with what had been anticipated.

If the profit shown by our first make-up is greater than our anticipation the management may or may not authorize the expenditure of more money for activities

which they deem advisable to strengthen. When the budget is finally accepted by the general manager, the figures on the working papers are typed on regular 8½ by 13 in. legal-size plain paper. Copies are distributed to the department heads and officers responsible for the budget performance.

Each month we make up a complete set of operating statements which tie in with our budgeted forecasts. Each schedule of expense is made up in detail and shows for each item the budget for the month, the actual for the month, and the amount saved or over, and the net total saved or over for the month, the cumulated budget to date, the cumulated actual, and the cumulated savings or over, and the cumulative net total saved or over. A perusal of these monthly reports shows in a very short time why our profit or loss is deviating from our budgeted figure.

Here is where our budget becomes our "rear-view mirror." When our performance is compared with our forecast, and it shows that a certain item of expense is running over the forecast, it guides our future action in regard to this particular expense. It tells us where we should use care and discretion in the spending of money. It shows us the items which need particular watching so that we will eventually attain that one thing—profits—which is the reason for the existence of any business concern.

By the use of our budget system we have been able to make some very accurate predictions. At the end of November, 1927, our cash balance equaled our predicted balance. For the same month the expenses of operating our Service Department were \$1.21 less than the forecast. The actual net profit for our company for the year 1927 differed from our forecasted and budgeted net profit by only \$111.12. On one list of expenses for the year 1928, involving over \$299,000, the actual was \$23.81 over the budget.

Budgeted forecasts which are as accurate as these are unusual. I cite these cases to show what can be done. For the past three years our actual experience as compared with our budget has shown a saving. Each year we find that we come a little closer to the actual.

The administration of our direct manufacturing expense schedule at one time gave us more trouble than all other schedules combined. We have 33 manufacturing departments, which are supervised by 15 different foremen. Naturally, where the expenses of these departments were combined in one schedule we found it rather difficult to lay our finger on the exact reason why manufacturing expenses would not tie in with the budgeted forecast.

Sold Idea to the Foremen

In the fall of 1927 we gave this problem a great deal of thought. We investigated systems used by several different firms, and finally adopted a plan which was put into effect Jan. 1, 1928.

The thought back of this plan was this: "If we can sell our foremen on the idea that they should spend not more than 'so much' for any one expense in each of their departments, they should be able to keep that expense within the limit set." This is the thought we used on our major executives when our budget was first put into effect.

By analyzing past expenses in the departments month by month and comparing these expenses with the departmental payroll for the same period we were able to determine rates for each expense and each department per \$100 of departmental payroll. We are changing this to each 100 hours of departmental labor.

Having determined the ratio or measure of expenses

for each department, the next step was to sell the foremen on these rates and the budget plan as a whole. I talked to each foreman and explained to him how such a budget would be administered and how we had determined what the departmental rates would be. The majority of our foremen looked upon this as a very good idea. They recognized in the proposed scheme a possible means of measuring their efficiency.

To enable the foremen to correct conditions in their departments as soon as possible, we adopted the plan of giving them weekly reports on their performance. These weekly reports are in the hands of the foremen within 10 days after the close of the pay period. This weekly budgeted performance shows the budget for the week, the actual expense for the week and the savings or loss for the week, with the same information cumulative for the month. Savings are shown in black; all

To stimulate the foremen's interest in the budget. I

To stimulate the foremen's interest in the budget, I prevailed upon the management to make an appropriation of \$100 a month to be awarded as prizes for budget performance. These prizes are given as follows: To the foreman saving the greatest percentage of possible expenses, \$30; second greatest percentage of savings, \$25; third, \$20; fourth, \$15, and fifth, \$10.

When the weekly budget performances are sent out a general letter covering the performance for the week is sent to all concerned. This letter gives the standings for each department for the month to date and also warns all foremen to bear down on all expenses which are showing up in red on their reports. The foreman of any department showing a net red figure for the month is asked to report to the comptroller and explain "why." These explanations gathered each week are written up in a general report and submitted to the management with our monthly operating statements. This method eliminates digging into past history.

UNIT OF BUDGET BASIS		STATE MOTOR CAR CO. OF AMERICA, INC.										
PER	\$100.00 of Payroll	Weekly Budget Performance										
FOR WH. ENDINGS	October 27, 1928	CONTROLLABLE MFG. EXPENSES										
FOR WH. ENDINGS	October 27, 1928	FOR DEPT.										
Machine Shop												
SYMBOL	DESCRIPTION	WEEKLY BUDGET BASIS		PERFORMANCE FOR WEEK				PERFORMANCE FOR MONTH				
		UNITS THIS WEEK	RATE	BUDGET	ACTUAL	SAVINGS OR LOSS	BUDGET	ACTUAL	SAVINGS OR LOSS			
230	RE-OPERATIONS ACCOUNT MTL. SH-T & S		.06	.09	-.07	149	156	103	53			
231	SALVAGE EXPENSE		.71	20.53	16.02	4.51	77.16	67.71	9.45			
232	MATERIAL LOSSES		2.59	74.90	60.30	13.5	281.46	158.16	123.32			
233	UNCONTROLLABLE LABOR LOSSES		2.21	63.91	160.77	96.76	240.18	209.22	31.86			
234	SALVAGING VENDOR DEFECTS		.02	.58	-.02	58	2.17	-.02	2.17			
235	IDLE TIME		.11	3.18	1.70	1.48	11.95	10.20	1.75			
236	DAY RATE GUARANTY		.12	3.47	1.13	2.02	9.55	13.04	23.03	9.99		
250	WASTE AND WIPING RADS		.08	2.31	2.25	.06	6.69	6.35	2.34			
251	OILS AND GREASES		78.92	.40	15.57	41.44	29.87	43.47	102.24	58.77		
252	Gasoline and Kerosene			.19	5.49	6.24	75	28.18	17.34	10.80		
253	PERISHABLE TOOLS AND ABRASIVES			5.44	157.32	165.93	8.61	591.21	576.16	15.05		
254	Electrical Supplies			.06	2.31	1.45	86	8.69	7.23	1.46		
255	GENERAL SHOP SUPPLIES			.67	19.38	30.95	11.57	72.56	74.13	1.29		
219	Dept. Stock Handling			.46	13.30	-.02	13.30	49.99	4.50	45.49		
222	Oilers			.34	9.83	12.00	2.17	36.94	48.75	11.81		
223	Sweepers and Janitors			1.91	1.91	55.24	37.59	17.65	207.57	146.52	61.05	
224	Tool Grinding			2.21	63.91	67.25	3.34	240.18	264.92	24.74		
225	Lay Out Work			.04	1.16	-.02	1.16	4.35	2.40	1.35		
226	Set Up Time			.07	2.02	-.02	2.02	7.60	2.55	5.05		
203	Foremen and Assistants			Per Wh.	45.00	45.00	41.63	3.37	180.00	164.95	15.05	
% OF EXP. SAVED OR LOST	FOR WH.	FOR WH.	STAND. INC.	FOR WH.	FOR WH.	TOTAL CONTROLLABLE EXPENSES	555.70	676.83	121.13	2105.65	1876.56	229.09
TOTAL SAVINGS OR LOSS FOR YEAR TO DATE												
MINT. MCHY AND PROCESSING EQUIPMENT												
MINT. STOCK HANDLING AND ASSEM. EQUIP.												
MINT. DIES, JIGS AND FIXTURES												
TOTAL MAIN'T EXPENSES												
Exhibit Number Two												
L. A. Baron BUDGET CONTROLLER												

This is a representative picture of a weekly expense budget which is given to Stutz departmental heads responsible for manufacturing department performances

As conditions change in our plant from time to time we have found that rates of expense in the different departments also have to be changed. A budget committee composed of the production manager, assistant production manager and myself is empowered to change expense rates when conditions warrant. Certain departments may be showing up in red for a given expense. If an analysis of conditions in this department show that the cause is beyond the control of the foreman the rate is increased. If the savings of any expense in any one department are so great as to attract attention, and we find that such savings are caused by a change in manufacturing procedure, the rates, quite naturally, are lowered.

This method to date has shown us some very interesting performances. We have found it a very good gage to check the efficiency of a foreman. Compared with past experience, expenses controlled in this manner show a saving of 11.6 per cent. For each \$1 given out in prizes, our savings have amounted to approximately \$65.

Isotta Aircraft Engine Approved

THE Isotta-Fraschini Asso 500 R. I. aircraft engine with I F speed reducing gear was officially approved by the Italian Department of Aeronautics on Nov. 23. The endurance test was preceded and followed by two one-hour tests during which the engine was operated under full throttle with the object of obtaining the official power curve. It developed a maximum of 514 hp. at 1300 r.p.m. of the propeller, corresponding to 1990 crankshaft r.p.m.

The 50-hour test was completed in five periods of 10

hours each, on successive days. During four of the periods the engine was operated at 90 per cent full power on the test stand, while during one 10-hour period it was operated with a tractive propeller turning at 1320 r.p.m. corresponding to 2030 r.p.m. of the crank-shaft.

The Isotta-Fraschini reducing gear is of the spur pinion type and incorporates no friction devices or elastic media; it is claimed to offer ample resistance to inertia forces and to have a long life.

Making Steel Castings *Electrically* Offers Distinct Advantages

Close temperature control is afforded, while deoxidation and reduction can be as thorough as desired. Phosphorus and sulphur may be eliminated as necessary.

By Ethelbert Favary *

Consulting Engineer, Moreland Motor Truck Co.

THE electric process for making steel castings offers several distinct advantages. It is flexible and is very well suited for the manufacture of castings. The temperature can be controlled within close limits. The deoxidation and reduction can be as thorough as desired and phosphorus and sulphur can be eliminated as completely as necessary.

In the acid process the phosphorus is controlled by purchasing scrap of known phosphorus content while deoxidation insures desulphurization. Electrically-produced steel has great density and can be made free from blow holes, from slag and from absorbed gases; it is strong, tough and ductile. To produce nickel steel castings, the nickel alloy is added directly to the bath before it is transferred into the ladle.

When the company with which I am connected first started to produce axle housings for its six-wheel trucks, several difficulties were encountered; I will mention them for the benefit of others who may wish to produce complicated castings.

At first in samples which were made like those shown in Fig. 1 were found shrinking cracks in the corners at *a*, *b* and at *c*. These cracks developed because of the greater mass of metal at these points, which adversely affected uniform cooling. To overcome these, the next step was to leave off the corners and add extra metal to the corners, as shown in Fig. 2, which were afterward turned off.

To still more effectively eliminate cracks, metal chills were added, as shown, but at the present time metal chills have been eliminated and instead a softer core is used, which is obtained by the employment of a softer binder for the sand. The shrinking cracks at *c* were more difficult to overcome and we had to

eliminate the circumferential ribs and cast longitudinal ribs, as shown at *e*. The small ring *f*, being attached to the ribs, instead of to the outer housing, does not influence the shrinkage of the housing and therefore a sound casting is produced free from cracks. The ring is necessary to support the end of the chrome-nickel steel tube which supports the wheel bearings.

To produce these axle castings requires careful attention throughout the process. It necessitates special core mixtures, sand mixtures and careful workmanship in the preparing of the mold. The specifications for these castings call for metals of the following limit:

Carbon	0.28% to 0.31%
Manganese	0.60% to 0.75%
Silicon	0.20% to 0.30%
Nickel	1.00%
Sulphur	0.05% maximum
Phosphorus	0.05% "

In these castings we used about 0.3 to 0.31 per cent of carbon; 1 per cent of nickel is added to the bath. As soon as these castings are poured they are withdrawn from the mold (the core being removed), then permitted to cool slowly.

Afterward they are annealed, the temperature being slowly raised (in 4 hr.) to 1625 deg. Fahr. and they are kept at this temperature for 2½ hr., then they are slowly cooled. The tensile strength of the metal is approximately 120,000 lb. per sq. in.

The charge for the furnace is made up approximately of 70 per cent of purchased scrap of known analysis, consisting of punching g's, plate, butt ends, I-beams, or solid tire rims. The balance is the returns in the form of rejections, heads, gates and sculls or spills. About 100 lb. of metal from the previous heat is left in the furnace and the new charge put into it. This forms a solid gummy mass and

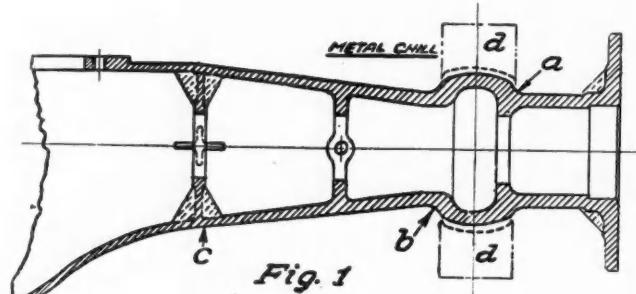


Fig. 1

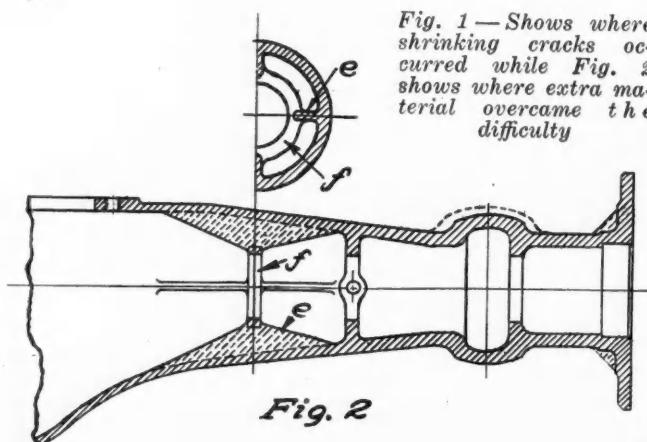


Fig. 2

Fig. 1—Shows where shrinking cracks occurred while Fig. 2 shows where extra material overcame the difficulty

* From a paper read recently before the Western Metal Congress at Los Angeles, Cal.

gives immediate electric contact and a hot arc—it eliminates the use of a starter such as coke. Some care is exercised in the charging to eliminate the necessity of much poking down as the melt progresses.

The preliminary melting is done on high tap. To melt down the charge usually takes about one hour. A sample is taken and a color test is run to determine

the preliminary carbon content. The reading of a fracture in highly refined steel is rather uncertain and a small laboratory, equipped to test the carbon by the color method, is recommended.

Since low carbon steels are used as a base, the melt will usually run low in carbon and this, in one of its many forms, is added. The immersion of the graphite electrodes will usually accomplish the desired result. Cast iron and pig iron may also be added if desired. Should the test show a higher carbon content than specified, a high grade, clean, hard hematite, low phosphorus iron ore is added to bring it down. The ore is added in small quantities until the desired specification is reached. The bath is then brought to the pouring temperature and tests made of the metal and the slag to ascertain whether a thorough deoxidation has been accomplished. This can be ascertained from the slag—a light green color of the fracture showing complete deoxidation. As a further precaution we add to the ladle a small amount of pure aluminum. The entire heat is tapped into a large ladle, the slag carefully skimmed off and a protective covering of clean silica sand put on. The metal is then transferred to pouring ladles of about 100 lb. capacity.

Selection of Material

To obtain satisfactory results the material used, as mentioned before, must be very carefully selected. Limestone and fluorspar are always on hand to dissolve slag when necessary, if alloys are to be added, afterward adding silica sand to bring the slag to its normal consistency. To produce about 2800 lb. to 3000 lb. of metal from the small furnace shows the following kilowatt hours: Net, per ton, 602; graphite electrodes, net per ton, 8 lb; melting time per ton, 40 min.; finishing time per ton, 18 min.; average per heat (2800 lb.) 1 hr. and 27 min.; average number of heats for silica brick roofs, 96. With the vitrified brick we now use, 300 heats are expected before renewal.

To sum up, I want to quote from "The Manufacture of Electric Steel," by Frank T. Sisco—who admirably gives the chemistry of the acid process:

"The steps involved in the chemistry of making a



Fig. 3—Two to 3-ton electric furnace used in Moreland Motor Truck Co. foundry

heat of acid electric steel are as follows:

"(1) The charge is melted with a minimum of oxidation. Silicon in the scrap is eliminated entirely by the time melting is complete; the manganese is eliminated more or less completely; and the carbon removed to some extent.

"(2) The slag, after melting is complete, is a complex iron-manganese silicate containing

about 55 per cent silica and 45 per cent iron and manganese oxides. This degree of relative acidity and basicity remains constant during the balance of the heat.

"(3) If the carbon, after melting, is too high, sufficient iron oxide in the form of ore or scale is added in small doses to reduce it to the desired amount. This desired amount is a percentage that, after a little is lost through the reactions of deoxidation, and after the final manganese addition is made, will be in the limits required by the finished product.

"(4) The slag is then deoxidized. This takes place in two steps: (a) By means of a little powdered ferromanganese the percentage of manganese oxide is increased and (b) by means of lime, calcium silicate is formed. These two steps are sufficient to reduce the percentage of ferrous oxide from 25 to about 15, sometimes even lower.

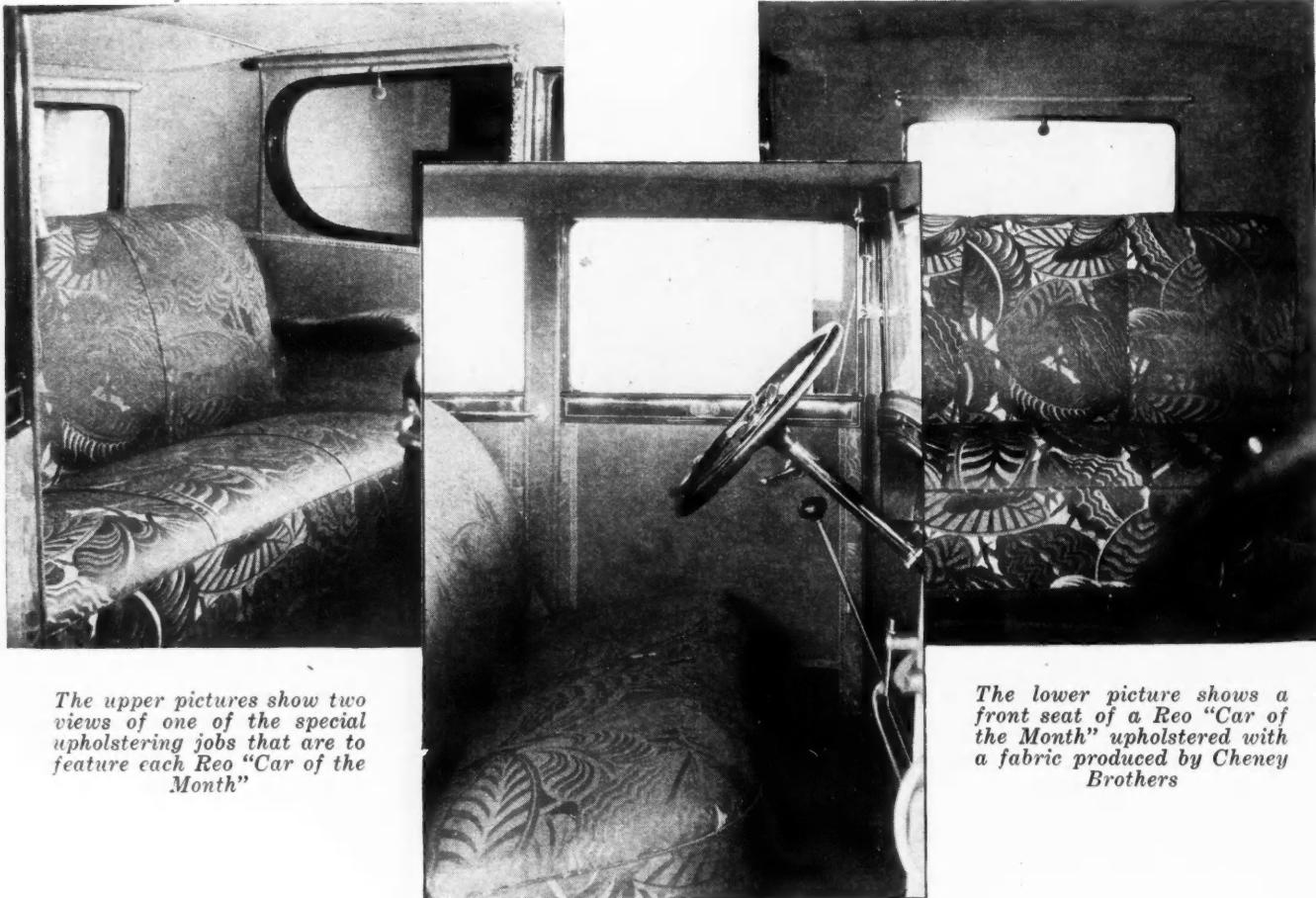
"(5) The decrease in ferrous oxide in the slag disturbs the equilibrium between the ferrous oxide in the bath and the ferrous oxide in the slag and produces a partial deoxidation of the steel by a migration of FeO from bath to slag to restore the disturbed equilibrium.

"(6) Deoxidation is further accomplished by the action of the carbon in the bath upon the ferrous oxide dissolved in the metal.

"(7) Due to the heat of the arc and to carbon in the metal some of the silica in the slag is reduced to silicon. This silicon migrates into the metal and aids in the deoxidation and degasification. If this silicon reduction is not sufficient to leave 0.15 to 0.30 per cent of the element, ferrosilicon is added.

"(8) Just before tap sufficient ferromanganese is added to result in a percentage equal to that required in the finished steel. Five to 15 per cent are allowed for loss.

"(9) Although the acid slag contains 25 to 40 per cent oxidizing constituents (FeO + MnO), if we lower the ferrous oxide percentage to the lowest possible point and take advantage of the benefits manganese may have on the steel, we may by these two factors bring the ill effects of the oxidizing slag down to a minimum and thus produce sound steel."



The upper pictures show two views of one of the special upholstering jobs that are to feature each Reo "Car of the Month"

The lower picture shows a front seat of a Reo "Car of the Month" upholstered with a fabric produced by Cheney Brothers

Unique Reo Merchandising Plan Calls for Debutantes

Each dealer to receive one "Car of the Month" besides quota, beginning this month. Debutante Bureau of Harper's Bazar to sell Flying Clouds.

BEGINNING this month, Reo dealers each month will receive one car in addition to their quotas. This car, which will be specially finished, will be known as the "Car of the Month" and back of it will be a unique merchandising plan designed to place these cars in the hands of the socially prominent in each territory and to stimulate sales of the Reo line generally.

The merchandising plan includes publication and radio advertising and the cooperation of the Debutante Bureau of *Harper's Bazar*. This bureau is said to have a membership of 2500 of the most socially prominent girls in 120 cities. From the bureau office in New York, one or more of these girls are to be designated to get in touch with each Reo distributor or dealer, wherever the bureau has representation. Each of the girls will receive advance information on the "Car of the Month" and will be furnished with descriptive portfolios, similar to that furnished dealers for salesroom use, to help interest friends and acquaintances after which they will give the dealer a list of names of persons they propose to bring into the salesroom for demonstrations.

For each demonstration actually made as a result of their efforts, they will receive a fee and a larger bonus where a sale is made.

In cities where the Debutante Bureau does not have representation, dealers are requested to select a socially prominent young woman who will function in the same manner as the members of the bureau.

The "Car of the Month" will be a de luxe edition of the Flying Cloud, the Master sport sedan, produced in limited quantities and upholstered in fabrics—a different one each month—which are said never to have been used in an automobile before and which are designed and woven specially for these models by Cheney Brothers. The finish will harmonize with the upholstery. Only one of these cars will be shipped to a dealer each month except in very large cities where a few additional cars will be available. This assures the purchaser of one of these models of a distinctive creation, as each month the upholstery and finish will change. The list price of the "Car of the Month" is \$1,970.

Just Among Ourselves

How About Changing Approach Service

THE car manufacturer for years has preached to the dealer that properly handled service is a powerful help in selling new cars. That doctrine has resulted in some progress in quality of service. On the average, service is probably better today than it was ten years ago. But, after all, the success achieved along these lines has been but indifferent. Could the reason lie in the point of attack on the problem? The idea is worth talking a bit about at least.

* * *

"Make Service Pay Profits," Slogan

LET'S admit at the outset the truth of the contention that good service helps to sell new cars. Visualizing service largely as an aid to new car sales, however, tends to make the average dealer think of it as a secondary rather than a primary factor in his business. Suppose the matter were stated to the dealer constantly and vigorously in a different way; suppose it were stated thus: "Service provides a chance for you to make money. You can make real profits from service work."

* * *

Quickest Route to Better Maintenance

JUST as soon as the dealer actually visualizes his service department as a profit-making part of his business—as a department valuable and vital to him in itself, regardless of its possible relation to new car sales—he probably is going to give more sincere and practical attention than ever before when he considered it as a secondary matter, even though of some importance. Once a dealer gets that profit-making idea as regards his service work, he is more likely than ever before to provide good service because he finds quickly—if he doesn't al-

ready know—that profits can't possibly be developed from that department unless he does a good job for the customer. The quickest way to good service, in other words, probably is through the profit possibilities route.

* * *

Lose Interest in Unprofitable Work

GOOD service, it can well be maintained, is likely to be developed far more quickly in the establishment of the dealer who is demanding a continuous profit from his service operations than in any other. Non-profitable departments are the hardest to keep at a high pitch of efficiency in any business; experience proves that pretty clearly. Thus through a different route than that commonly emphasized in the past, the car manufacturer might help his dealers to that good service which does indeed aid in selling new cars.

* * *

Few Words Will Summarize Thought

SERVICE is an opportunity for dealer profits. Service profits can come only as a result of good service. Good service means satisfied owners and favorably-minded prospects. Satisfied owners and favorably-minded prospects mean more new and used car sales. The manufacturer wants more car sales.

* * *

Service Profits Necessary in Future

AND entirely aside from its potency as a new car sales aid, both in keeping old owners sold and in bringing prospects into the dealer's place of business, profit-making service activity may well turn out to be an absolute essential to financial stability and permanency for the average automobile dealer of the future. While a dealer intent upon profits from his

service station may do some things which his factory does not for the moment desire him to do, he probably will be making himself into a more stable and permanent representative for that factory in the long run. The wise automobile dealer of the future is going to make money out of his service and maintenance operations... And competition is becoming so keen that some time in the future it is quite possible that only the reasonably wise ones will be in business.

* * *

Massachusetts Has Insurance Trouble

THE insurance department of the United States Chamber of Commerce has sent a warning to its members that compulsory automobile insurance is far from proven as an antidote to reckless driving. It points to the great increase in accidents in Massachusetts since the inauguration of the compulsory insurance law in that state as support for its viewpoint. Massachusetts' experience with this law throughout, as a matter of fact, seems to be indicating the correctness of the views of those who have urged strong objections to this type of legislation. The ends sought by the proponents of compulsory insurance are such as to be desired by all good citizens; the trouble is that compulsory insurance doesn't seem to achieve those desirable ends. There can be little question that the furor caused by the working out of the law in Massachusetts is going to have a distinctly adverse effect on the various compulsory insurance laws being proposed in other states this year. The Bay State has been looked upon as a compulsory insurance proving ground for many months; the results of its experience so far have not been such as to make many other states desire to go and do likewise.—N.G.S.

NEW DEVELOPMENTS—Automotive

Landis Hydraulic Crank Grinders

A NEW product of Landis Tool Co., Waynesboro, Pa., is the Type AB crank grinder with which all the pins of a crankshaft may be ground without removing the work from the machine. The work spindles are driven through a longitudinal shaft so that both fixtures are rotated in unison. The final drive to each work spindle is through a silent chain. Crank-carrying fixtures with hydraulically-operated work clamps are provided with a safety device, making it impossible to rotate the fixtures before the shaft is securely clamped.

The hydraulic work rest is attached to the bed of the machine directly in front of the grinding wheel regardless of the pin being ground. The jaws are advanced or withdrawn by hydraulic pressure with final adjustment by hand-adjusting screws. Unless the jaws are in their back position the work carriage cannot be traversed, making it impossible for the operator to accidentally jam the work against the work rest jaws by traversing the carriage before the jaws are in their back position.

The crankshaft is located endwise by bringing it against a stud on the side of the indexing fixture plate or bringing the shoulder of the rear bearing against the side of the clamping block. The indexing plate is incorporated in the work carrying fixture and locates the shaft either from the holes in the flywheel flange or from locating lugs on the cheek of the crank. Spacing is accomplished by a rigid bar on which lugs are fastened in the proper relation to each other according to the spacing of the pins on the shaft. A positive stop on the under side of the work table comes against the top lug on the bar, thus placing the corresponding pin of the shaft in front of the grinding wheel. To eliminate shock and vibration when the carriage traverse

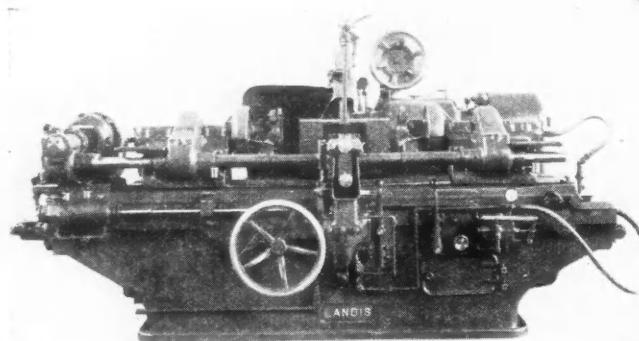


Fig. 1—Landis Type AD hydraulic crank pin grinder

stops, a hydraulic cushioning device is attached to the end of the bar.

All the necessary oil pressure is supplied by a twin-gear ball-bearing oil pump. One set of gears takes care of the hydraulic reversing motor, the other set the work rest, work clamps and hydraulic wheel feed. Any carriage traverse speed from 12 in. to 360 in. per min. is available by the manipulation of a single control valve. Reversal at any speed without shock is obtained by means of a balanced piston valve.

The grinding wheel head is large and equipped with

a 36-in. diameter grinding wheel carried by a V and a flat guide with chilled surfaces. Adjustable steel babbitt-lined bearings are used with automatic lubrication by a small pump driven from the spindle itself direct through a silent gear.

The hydraulically-operated power wheel feed is controlled by levers close to the feed-up hand wheel, the speed of the infeed being regulated by means of a dash

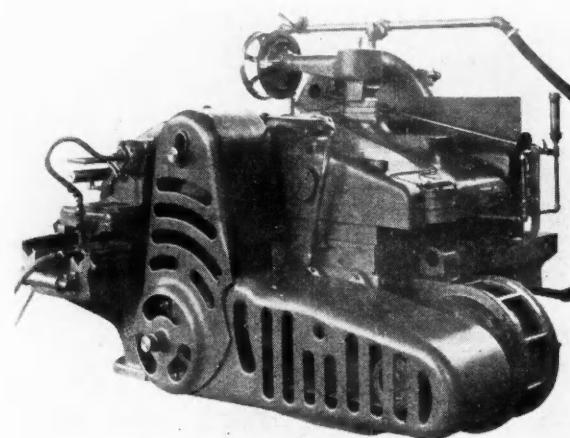


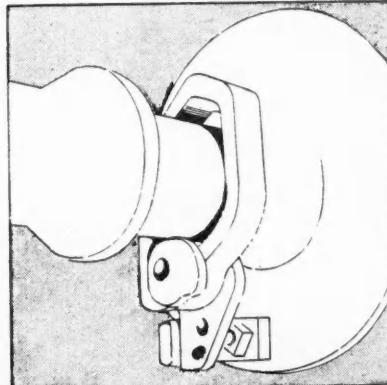
Fig. 2—Detail of driving ends of crank pin grinder
Showing use of portable gas detector

pot. Positive stops are provided so that the position of the grinding wheel, with relation to the work, is always fixed. The main drive motor is 24 hp., either a-c. or d-c., and is mounted on the rear of the machine. An eight-strand tex-rope drive conveys the power. Coolant is supplied by a centrifugal pump located at the left-hand side of the bed and driven by the traverse oil pump shaft. This type of machine is available in the 16 by 32 in. and 16 by 42 in. sizes.

Peacock Lathe Dog

ROLAND R. PEACOCK, 913 Collings Ave., West Collingswood, N. J., has invented a lathe dog that grips the work by eccentric action. He claims for this dog that it cannot slip and damage the work. In fact, the greater the drag on the work due to the action of the cutting tool the tighter the dog holds. The dog is simple to apply and operate and it is claimed to be both safer and speedier than the conventional type of a dog.

Showing peacock lathe dog in use



Parts, Accessories and Production Tools

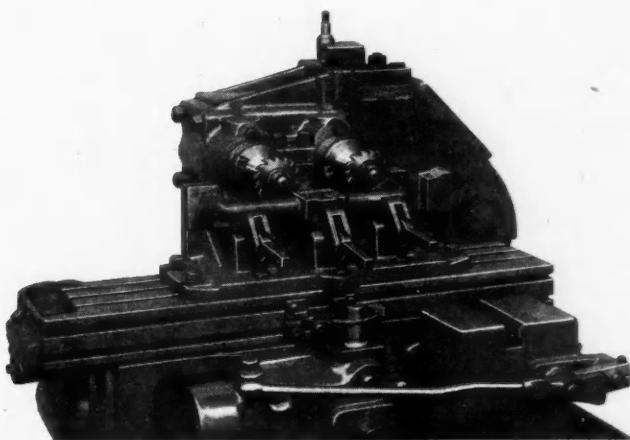
Milling Bolt Lugs

A CINCINNATI 24-in. plain automatic milling machine is being used by one automotive manufacturer to mill the bolt lugs of a cast-iron intake manifold at the rate of 65 pieces per hr.

The machine is equipped with a special two-spindle horizontal spindle carrier and a reciprocating feed box, but otherwise is a standard tool. The work is held in the milling position by a special fixture mounted on the machine table which locates the work from three finished flange faces and by two dowel pins passing through the drilled holes in the flanges. Three cam clamps are employed for holding the work in position.

The piece is set in the fixture with the two cutters between the bolt lugs. The table is then fed in one direction to mill two of the lugs, after which the direction is reversed and the other two lugs are milled. All four lugs are finished at a single setting.

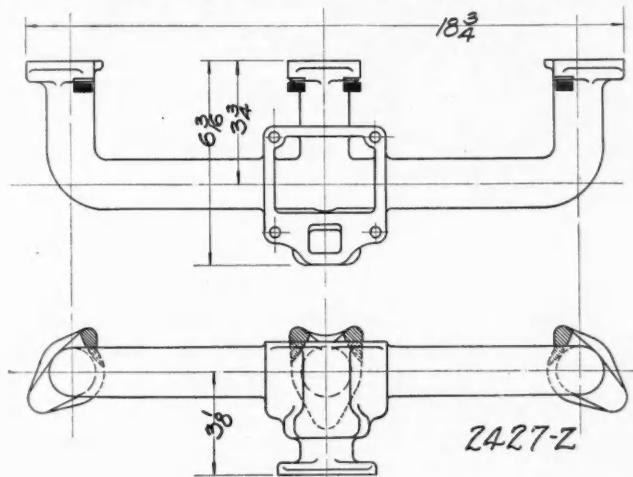
In the illustration can be seen the dogs in the center of the table which actuate the plungers that, in turn,



Cincinnati milling machine set up for milling intake manifold bolt lugs

control the direction of the table movement. The entire cycle is handled automatically. All the operator has to do is to load and unload the work and engage the feed.

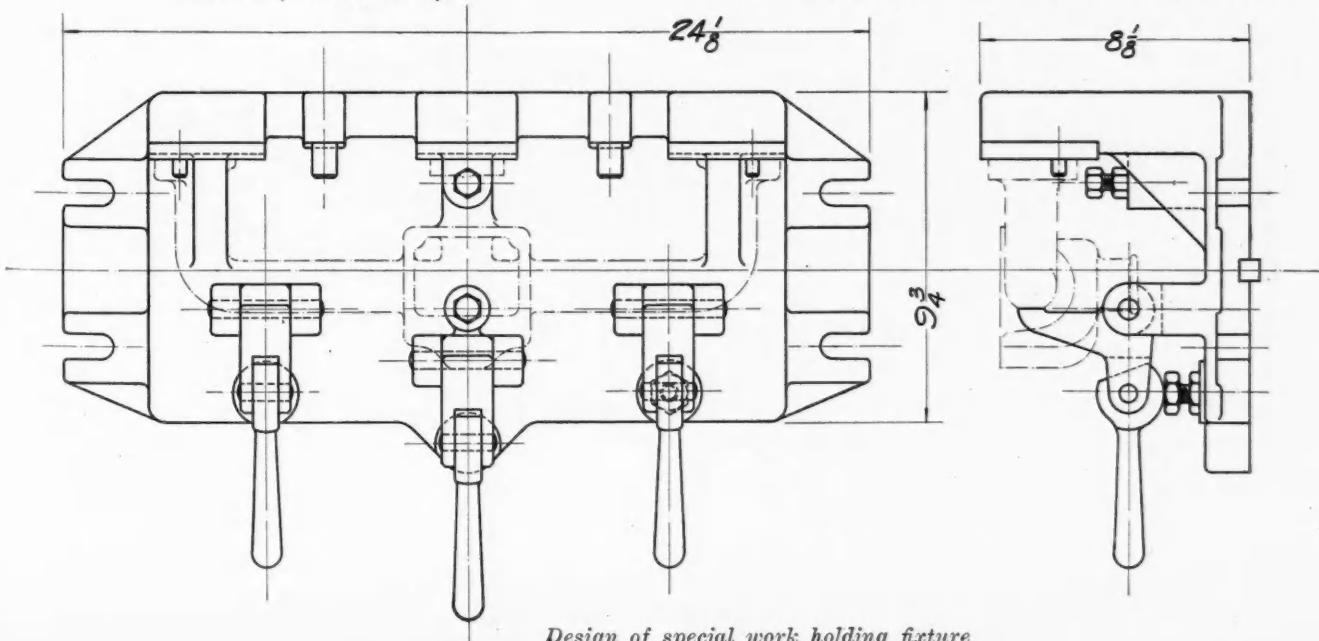
About $\frac{1}{8}$ in. stock is removed by the two 4-in. diameter half side mills mounted on two special stub arbors. The cutters run at 75 r.p.m. The table feed is 6.4 in. per min., giving a time per piece of 0.80 min., or about 65 pieces per hr.



Sketch of intake manifold

Brown & Sharpe Gage

THE Brown & Sharpe Mfg. Co., Providence, R. I., has announced a new twist drill and machine screw tap gage, by use of which the correct drill to use with any common size of machine screw tap can be readily ascertained. The gage, known as No. 707, is hardened and all sizes are tested for accuracy after hardening. On the left side of the gage is a table giving size of tap, pitch of thread, size of tap drill and size of drill.



Design of special work holding fixture

Portable Gas Detector

THE Union Carbide Sales Co., 30 E. Forty-second St., New York, has placed on the market a portable instrument that detects immediately the presence of a wide range of combustible gases or vapors and indicates whether or not the atmosphere containing these gases is safe to breathe and safe for flames or fire. This

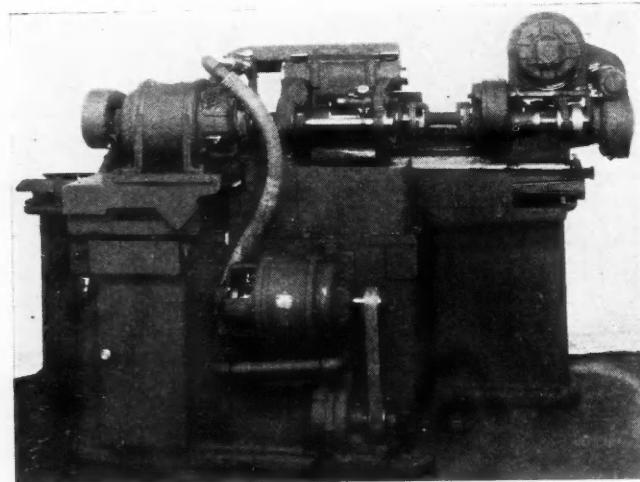


Portable gas detector that has been placed on the market by the Union Carbide Sales Co.

device is said to have many advantages over the usual methods of protecting gases because of its sensitivity, the rapidity with which readings may be taken, its portability and its independence on any non-portable source of power.

Grinding Aircraft Engine Cams

THE grinding of cams in the automobile industry has been so generally successful that it is not at all unusual that the same method has been adopted for the production of cams for the radial type of aircraft engines. The problem of grinding cams for radial engines, however, is considerably different from that involved in the conventional automobile engine cams, inasmuch as the radial motor cams are generally



Back of Norton radial engine cam grinder

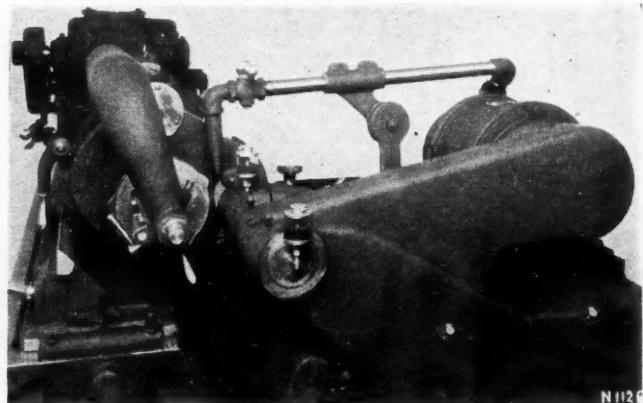
much larger and have contours with several lobes adjacent to which are re-entrant curves of comparatively small radii.

Two such cams are usually made integral and sep-

arated by a narrow space. Automobile cams very seldom employ re-entrant curves and in the few cases where such cases are required the radius is seldom less than 3 or 4 in. Radial motor cams, however, have re-entrant curves of such small radii that grinding wheels less than 1½ in. in diameter may sometimes be necessary to finish the contour.

For this sort of work the Norton Co. has developed a specially arranged grinder which is equipped with a motor driven grinding wheel spindle and a cam grinding attachment for large diameter loose cams. The cam grinding attachment is driven from a special headstock having an extra speed reduction to obtain the slow speeds of revolution necessary in grinding this type of cam. Fig. 1 shows a rear view of this equipment, showing the three motors employed for driving the pump, the wheel spindle and headstock. Fig. 2 is a detailed view of the equipment and shows a pair of test cams in grinding position. The grinding wheel can be seen in contact with a point of the further cam.

Grinding of this type of cam with small wheels is a much slower operation than the grinding of automobile cams, since the surface to be ground is several times greater, and the smaller radius of the re-entrant curves requires slower revolutions in order that the roller may follow the master cam and the grinding wheel have time to cut. It is also impossible



Detail of cam grinding attachment

for a very small grinding wheel to remove metal as rapidly as a large wheel.

Wear of the grinding wheel is always an important factor in cam grinding as a small reduction in the size of the wheel will affect the shape of the contour. When using very small wheels on large cams the wheel wears rapidly, and for very accurate work the final finish grinding must be accomplished with a new wheel.

Roller-Smith Circuit Breakers

THE Roller-Smith Co., 233 Broadway, New York City, has developed a new line of small, enclosed air brake circuit breakers, known as Type EAF, which are offered for the protection of motors and feeder circuits against overload and failure of voltage. They are made in two capacities from ½ amp. to 80 amp., 250 volts D.C. and 550 volts A.C., two and three pole, overload, under-voltage, time limit, free-handle, all full enclosed.

More Aircraft Engine Standards Sought by Army-Navy Group

*Proposed acceptance test, as modified after discussion,
will be circulated in the industry before move for
final approval. Several specifications adopted.*

By John F. Hardecker

THE fifth annual Army-Navy Aeronautical Standards Conference was held at the Naval Aircraft Factory, Philadelphia, during the week of Feb. 11. Attended by over 150 delegates representing all phases of the aircraft industry, it was opened with a brief address of welcome by Commander Ralph D. Weyerbacher, manager of the Naval Aircraft Factory, and then divided into four sub-groups—Powerplant, Specifications, Instruments and Aircraft Parts—which held simultaneous sessions in accordance with a pre-arranged schedule.

A total of 97 sets of specifications and 94 drawings came before the conference for discussion. Definite action was taken in the majority of cases, but in some instances it was necessary to postpone action pending further developments and tests. It obviously is impossible to report on all the items in detail, so comment will be confined to the powerplant subjects as being of greatest significance to our readers.

Of major consequence was the discussion of the proposed "Acceptance Test for Aircraft Engines." Many comments were received from engine manufacturers' representatives as well as government engineers, which will be correlated for incorporation into a new specification table to be circulated in the industry before consideration for final approval. The need for a practical working standard for acceptance tests long has been felt.

Another vexing problem was solved with the adoption of the A N specification for mica porcelain spark plugs for airplane engines. The specification incorporates interchangeability features, tests and technical requirements, so that it will become a practical manufacturing guide.

Specification for Generators

The limiting dimensions and tolerances, necessary interchangeability for attachment and detail requirements, including clearance features, were defined in an A N specification for generators. In the instance of hand starters, the tentative specification was assigned to the Army for further development. An A N specification controlling capacity, installation sizes, elements of construction and weight was adopted for aircraft storage batteries.

The A N specification accepted for refueling pump purchase establishes the requirements for capacity, working, clearances and interchangeability. In this way, any pump manufacturer has full scope in developing the details of his pump design, providing only that

the product conform to the general requirements of the A N specification. The tentative specification for hose clamps and the detail drawings for radiator tubes were adopted without change.

It was considered that performance tests would be more appropriate for fuel line fittings than the adoption of detail dimensions for any one style of proprietary fittings. Filler caps for tanks and radiators are to be tested further before a final decision is reached on an A N standard.

A general specification for purchasing high tension cable for ignition work on aircraft engines was adopted, with certain detail changes recommended by the conference delegates. It gives all detail requirements for dielectric properties, insulation, wire composition, etc.

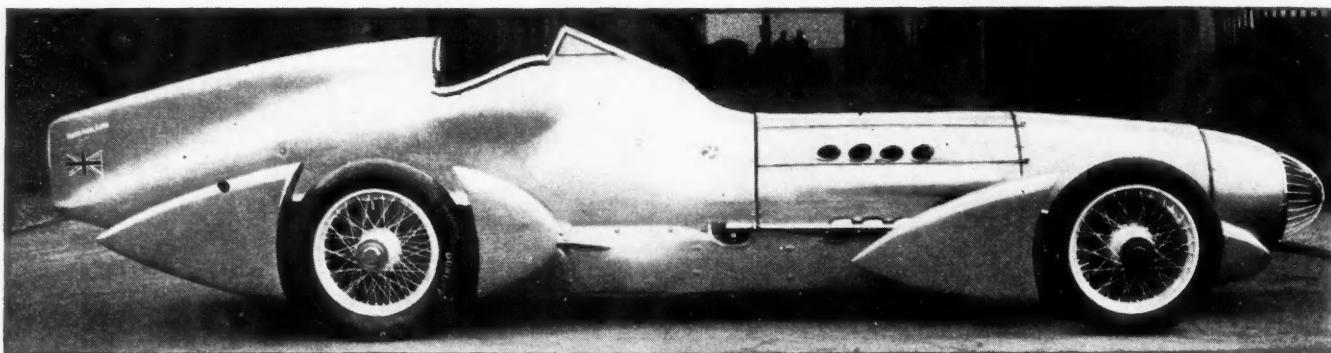
Types of Propellers Discussed

The following types of propellers were discussed in detail: (1) Micarta; (2) Wooden; (3) Aluminum alloy detachable blades and clamp ring. As a final action, general specifications covering finish, workmanship, material, balancing, testing and detail requirements were adopted. The S.A.E. dimensional standards for propeller hubs and crankshaft ends were endorsed as A N standards, thus insuring interchangeability between propellers and engines of different manufacture.

A very significant start was made in the small engine parts field, in which standardization has not hitherto been attempted. The existing situation, with respect to the confusion ensuing from each manufacturer developing his own details, so that the products of no two usually are interchangeable, although they well might be in most instances from a technical viewpoint, was thoroughly analyzed and discussed.

As a consequence, steps were taken to initiate A N standards for taper pins, Woodruff keys, cotter pins, fillister head screws, copper asbestos gaskets and lock washers. The details were settled on in most cases, and they will be prepared in final form by the Navy and recirculated to the engine industry for consideration for accepted use in future design.

The result of correlating the needs and requirements of the aircraft industry should have a decidedly beneficial effect on aircraft engine production in the future. Just as the A N standard has wielded a considerable influence in the simplification of plane design and servicing, so it is felt it will in time help the engine building industry. The cooperation extended by the industry through representatives as the conference appears to assure the ultimate fulfillment of this aim.



Effectiveness of the new streamline body on this former world's champion speed car soon will be tested when it is driven by its owner, Captain Malcolm Campbell, in an attempt to regain the title

Captain Campbell Prepares "Bluebird" for Speed Record Trial

CAPT. MALCOLM CAMPBELL'S "Bluebird" racing car, with which he is planning to attack the world's speed record in South Africa, is the same one with which he broke the record at Daytona last year only to have the honor wrested from him soon afterward by Ray Keech.

In general the chassis has not been varied since it was described and illustrated in *Automotive Industries* of Feb. 25, 1928, but an entirely new body has been fitted to give a better streamline effect and to secure better wheel adhesion by utilizing the pressure of air currents. A single radiator in the conventional position is used instead of the two alongside the tail, one at each side, as last year.

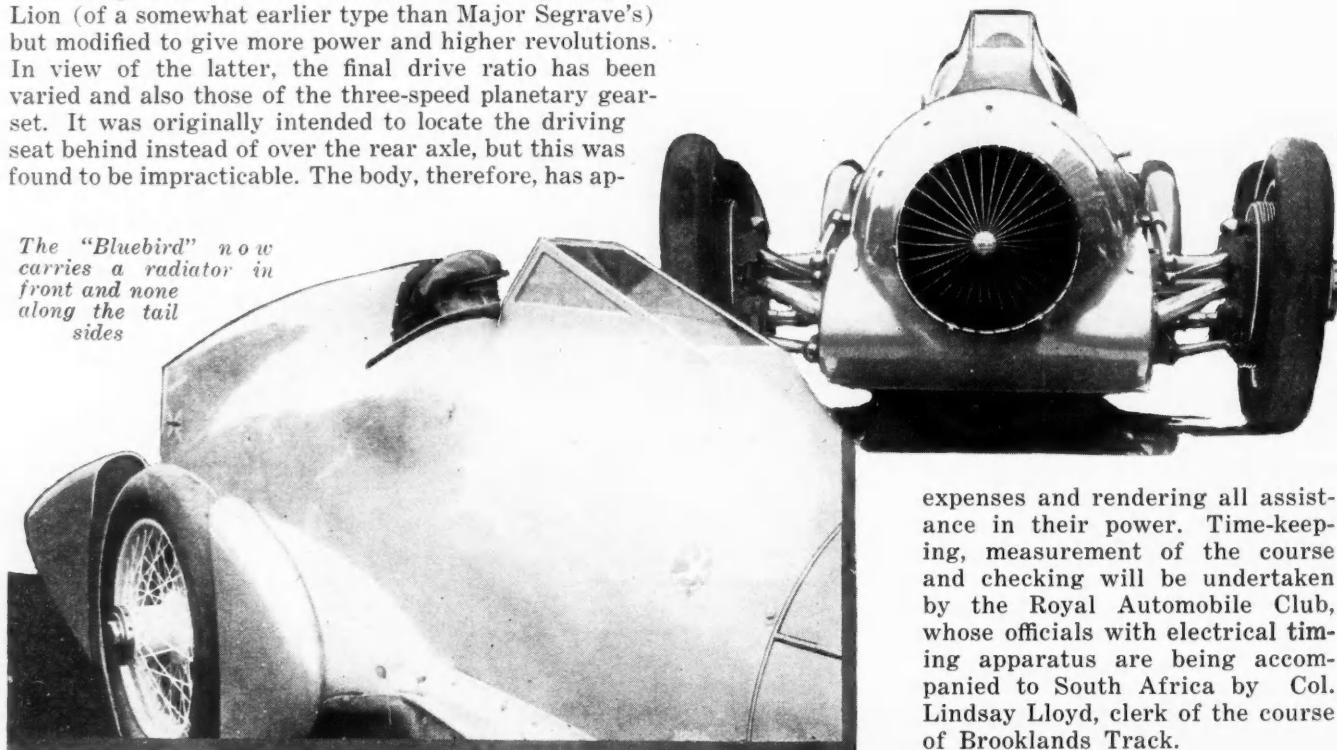
The engine is the same, a 12-cylinder 900 hp. Napier-Lion (of a somewhat earlier type than Major Segrave's) but modified to give more power and higher revolutions. In view of the latter, the final drive ratio has been varied and also those of the three-speed planetary gear-set. It was originally intended to locate the driving seat behind instead of over the rear axle, but this was found to be impracticable. The body, therefore, has ap-

preciable greater overall height than Segrave's car, in which, it may be recalled, the driving seat is located in front of the axle between the two propeller shafts.

The projected scene of Campbell's attack on the speed record is the expanse of a dried lake known as Verneuk Pan. It lies almost due north of Cape Town, some 600 miles away, 75 miles from the nearest railhead (Zak River) and 45 miles from the nearest village. It is unlikely that the record attempts will be made before the end of March, for among the difficulties to be overcome are the clearing away of stones, etc., by gangs of native laborers.

The South African Government and the Automobile Club of South Africa are making contributions toward

The "Bluebird" now carries a radiator in front and none along the tail sides



expenses and rendering all assistance in their power. Time-keeping, measurement of the course and checking will be undertaken by the Royal Automobile Club, whose officials with electrical timing apparatus are being accompanied to South Africa by Col. Lindsay Lloyd, clerk of the course of Brooklands Track.

News of the Industry

PAGE 385 VOLUME 60

Philadelphia, Saturday, March 2, 1929

NUMBER 9

Lotteries Solving Used Car Problem

WASHINGTON, Feb. 28—Automobile dealers in the Madeira Islands have found an effective solution to the perplexing used car problem. As only a small percentage of local dealers will accept used cars in part payment, says a report received this week by the Department of Commerce, lotteries are often resorted to as a means of disposing of old cars. The older the car, the cheaper the lottery ticket, says the report.

Canadian 1928 Exports Exceed Two Prior Years

WASHINGTON, Feb. 28—The total value of Canadian automotive exports in 1928 was \$36,028,481, representing a substantial increase over the years 1927 and 1926, when exports totaled \$28,428,997 and \$32,736,901, respectively, according to a statement issued this week by the Department of Commerce.

Canadian production of motor vehicles last year totaled 242,382 units as compared with 179,054 in 1927, says the department. Of this number about 33 per cent was exported, leaving 67 per cent for home consumption. Adding to this 49,206 units imported from the United States, the total required by the Canadian market is brought to 212,200, an increase of 32 per cent over the 1927 figure.

Ford Expanding Abroad

NEW YORK, Feb. 28—Confirmation of reports that Ford Motors, Ltd., British organization of Ford Motor Co., is to make a large stock offering at Brussels, was received yesterday by Beltram A. Unger & Co., Wall St. The offering expected to be made late in March, is to consist of 40,000,000 francs at par of 100 francs, the remaining 60 per cent of the issue to be retained by the English company. Reports from Paris say that Ford is about to launch an intensive campaign to extend sales in Europe.

High Production Results In Hastening Deliveries

PHILADELPHIA, March 2—With automobile factories on a scale of production during the last few days of February likely to round out an all-time record for the month, new car sales throughout the country are continuing favorable. The only noticeable effect of high factory output, as far as dealers' stocks are concerned, appears to be the hastening of deliveries. Severe weather conditions in some of the western sections have caused a drop in sales, but this is interpreted by many dealers as a delay in purchases, making the outlook for an unusually active spring even better.

McKinnon-G.M. Deal Nears Completion

ST. CATHERINES, ONT., Feb. 28—Directors of McKinnon Industries, Ltd., were to meet in Toronto late this afternoon to arrange completion of the proposed sale of the company to General Motors, based on an exchange of three General Motors shares for four of McKinnon. It is announced that 82 per cent of the McKinnon stock, 75 per cent of which was required for approval of the deal, has been turned in by shareholders to the National Trust Co.

It is expected that General Motors will appoint a new board of directors which will launch an immediate program of expansion for the McKinnon plant in this city. An expenditure of \$4,000,000 is contemplated in carrying on the manufacture of transmissions, wheels and other automotive parts for the General Motors plant at Oshawa.

B. W. Burtell, president of McKinnon, has announced his belief that the sale would prove satisfactory to shareholders of the company. General Motors, by the acquisition of property here, has some 15 acres for building purposes. It is announced that H. J. Carmichael, one of the present McKinnon directors, will be the local superintendent.

Durant Scores Federal Board

NEW YORK, Feb. 29—W. C. Durant said yesterday that the Federal Reserve Board's recent warning against speculation had accomplished nothing more than an overnight panic which cost the public hundreds of millions of dollars.

Despite the huge production program of the Ford Motor Co., dealer stocks in cars of this make reflect no abnormal expansion. Deliveries have been quickened and some dealers are making deliveries at the time of sale. In many sections the predicted return of Ford to his accustomed stride is confirmed in reports that he is leading in sales, even where the demand for other low-priced cars is good.

The used car situation continues to draw varied reports, some centers showing increases in stocks of this class with other vicinities reporting decreases. Sales of tires, accessories, parts and equipment are reported generally good.

Production schedules for March indicate that this month will exceed the best March in the history of the industry. It is of course impossible to set a definite advance figure on the entire output, but close students of production trends are of the opinion that at least 500,000 passenger cars and trucks will be made during the month. Preliminary estimates place the number of units produced in February between 450,000 and 470,000.

Assuming that the 500,000 car estimate for March is conservatively correct, and taking the February figure of 450,000 and adding these to the 423,655 cars and trucks actually produced in January, results in a total of 1,373,655 vehicles for the first quarter of the year. This compares with 1,164,485, the previous high mark set during the first quarter of 1926. It compares further with 1,007,287 during the first quarter of 1928 and with 996,437 during the first quarter of 1927.

Chevrolet Motor Co. announces its February production as approximately 119,000 units and reports that its pro-

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Gotfredson, Ltd., in Receivership

Detroit Subsidiary Hopes to Avert Similar Fate When Creditors Meet

DETROIT, Feb. 26—The National Trust Co., Ltd., of Toronto, has been appointed receiver and manager of the assets of the Gotfredson Corp., Ltd. While the receivership affects the Gotfredson Truck Corp. of Detroit, the American company has not gone into the hands of a receiver, M. H. Coleman, secretary and treasurer, told *Automotive Industries*. Creditors of the American company are to meet in Detroit, March 4, to consider the situation and Mr. Coleman stated that the company expects to work out a plan whereby the American company will avoid a receivership.

The National Trust Co. is trustee for the holders of bonds of the Gotfredson Corp. issued in July, 1927. Frederick H. Mackelcan, of the trust company, states in an affidavit that the bond issue was one of \$1,000,000 6 1/2 per cent first mortgage convertible sinking fund gold bonds. The Gotfredson Corp. also pledged to the trustees 14,500 shares of the capital stock of the Gotfredson Truck Corp. of Detroit, out of an authorized issue of 15,000 shares.

Mr. Mackelcan says that he believes the Canadian company has advanced to its subsidiary in Detroit an open account without security which amounts approximately to \$448,000 and has also guaranteed payment to its subsidiary all obligations of the company amounting approximately to \$1,200,000. The Canada company has also leased to its subsidiary part of the mortgaged premises in Detroit, Cleveland and Los Angeles for an annual rental of \$115,000 which is now in arrears.

Mackelcan points out that the Canadian company is unable to carry on its business owing to lack of working capital, that its plant is practically shut down and that wage rolls of \$20,000 have not been met. Negotiations to procure working capital failed because of the inability to get release from the Detroit subsidiary of the guarantees, it was explained.

Country's Largest Bank Formed in Huge Merger

NEW YORK, Feb. 25—Consolidation of the National Bank of Commerce and the Guaranty Trust Co., forming the largest bank in the United States with combined resources of about \$2,000,000,000, was announced today after meetings of the boards of directors of both companies. The consolidation provides that the Bank of Commerce first increase its capital stock to \$30,000,000 by the issuance of \$5,000,000 of additional stock. This stock together with that of Guaranty Trust, \$40,000,000, will then be ex-

changed for stock of the new company which as yet has not been named.

The principal officers of the consolidated company will be: J. S. Alexander, now chairman of the Bank of Commerce, chairman of the board; C. H. Sabin, now chairman of Guaranty, vice-chairman; W. C. Potter, now president of Guaranty, president. The directors of both companies will be combined in the enlarged institution.

Mayo Will Operate Heer Engine Plant

COLUMBUS, OHIO, Feb. 27—Announcement has been made that the Mayo Equipment Co., of Dayton, has exercised option on the plant of the Heer Engine Co., which will be used for the manufacture of automotive equipment and tools. The Mayo company has purchased all of the engine manufacturing equipment and will produce the Heer engine in conjunction with about 30 different kinds of garage equipment, gears and parts.

The Mayo Equipment Co. was organized about two years ago in Huntington, W. Va., and took over a number of patents held by E. G. Livesay, inventor. John C. C. Mayo, of Ashland, Ky., financed the company. It was removed to Dayton later and marketing was done through an outside source.

The leading stockholders of the company are: John C. C. Mayo, Mark W. Selby, Homer C. Selby, Roger Selby and Charles Scudder. Capital authorized is \$250,000 which will be increased to a much larger amount. Products of the company are gears, wheel pullers, wrecking cranes, hydraulic jacks, broaches, wrenches and other equipment. The company will start active operations at the Portsmouth plant some time in March.

AC Spark Plug Re-elects de Guichard as President

FLINT, MICH., Feb. 28—At the annual meeting in Detroit of the stockholders and directors of the AC Spark Plug Co., all officers were re-elected as follows: B. W. de Guichard, president and general manager; H. H. Curtice, vice-president and assistant general manager; T. G. McDougal, vice-president; W. E. Ross, comptroller; T. S. Merrill, secretary, and M. L. Prentis, treasurer. President de Guichard, in a review of 1928 activities, declared that that year was the most successful in the history of the AC company.

Metalcraft to Add Plant

DETROIT, Feb. 28—The Grand Rapids Metalcraft Corp. will announce an expansion program soon which is expected to be an additional factory probably located in Detroit to handle the manufacture of the Kelch ventilating heater recently taken over by the company, according to R. W. Hook, president. Several locations are under consideration. Whether this new factory will be operated as a direct part of the company, Mr. Hook declined to state.

Business in Brief

Written by the Guaranty Trust
Co., New York, exclusively for
AUTOMOTIVE INDUSTRIES

NEW YORK, Feb. 28—Business during last week has been hurt in many sections of the country by the cold weather. The high temperatures have tended to check building activity, lumber production, and mining. The bad conditions of the roads has made deliveries difficult, and retail trade also suffered.

COAL PRODUCTION

The production of bituminous coal during the week ended February 9 amounted to 12,090,000 tons, as compared with 9,749,000 tons in the corresponding week last year. The output of anthracite coal during the week ended February 9 totaled 1,795,000 tons as compared with 1,718,000 tons the week before, and 1,466,000 tons in the corresponding week last year.

FREIGHT CAR LOADINGS

Car loadings continue to run ahead of last year's levels, but below the levels for 1927. Car loadings for the week ended Feb. 9 totaled 955,478 cars, which represents an increase of 49,001 cars above those in the similar week in 1928 but a decrease of 7,124 below those in the corresponding week in 1927.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Feb. 23 was 98.0, which compares with 97.6 the week before and 97.1 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Feb. 20 were 38 per cent above those in the similar week in 1928.

STOCK MARKET

The stock market last week experienced no pronounced liquidation such as took place the week before. There were occasional weak spots, but the failure of the Federal Reserve bank of New York to raise its rediscount rate had a bullish effect, and the week was marked by recovery and a steadily rising tendency. Brokers' loans in New York City during the week ended Feb. 20 decreased \$91,000,000 and on that date totaled \$5,477,000,000. There was, however, an increase in loans placed for private corporations and individuals.

FEDERAL RESERVE REPORT

The consolidated statement of the Federal Reserve banks for the week ended Feb. 20 showed decreases of \$39,000,000 in holdings of discounted bills, of \$35,400,000 in bills bought in the open market, and of \$4,600,000 in holdings of Government securities. The Reserve ratio on Feb. 20 was 70.8 per cent.

Spring Parts Firms Plan Consolidation

Kay Mfg. and Nachman-Springfilled Agree to Link Interests

CHICAGO, Feb. 27—An agreement has been concluded for the consolidation of the Kay Mfg. Co., of Brooklyn, with the Nachman-Springfilled Corp., of Chicago, Fred A. Nachman, president of the latter concern, announced yesterday.

"A meeting of our stockholders will be called in the near future to approve this transaction," Mr. Nachman said. "The Kay Mfg. Co. transaction involves an exchange of stock which was already authorized but held in the treasury, so that no further increase in authorized capital is necessary. Upon completion of this transaction the Nachman-Springfilled Corp. will have outstanding 101,500 shares of capital stock."

The main plant of the Kay company is at Brooklyn, with a branch at Chelsea, Mass., and warehouses in San Francisco, Los Angeles, Philadelphia, Chicago, Grand Rapids and Baltimore. In addition to the same line of spring construction manufactured by the Nachman-Springfilled Corp., the Kay Mfg. Co. produces metal spring constructions as well as accessories for furniture manufacturers.

Thermoid Co. Stock Offered to Public

NEW YORK, Feb. 27—Thermoid Co., which was organized recently by the merger of the Thermoid Rubber Co. and Stokes Asbestos Co., has been capitalized with an authorization of \$2,000,000 in seven per cent cumulative convertible preferred stock, 600,000 shares of no par common stock and \$3,000,000 in five-year six per cent sinking fund gold notes. Of this authorization there are outstanding \$1,000,000 worth of preferred stock and 200,000 shares of common stock that are now being offered to the public and \$2,500,000 worth of the gold notes.

The stock was sold on the basis of one share of common and one share of preferred in a unit at \$110 a unit. The bonds carry warrants entitling holders to purchase common stock at \$25 per share in the ratio of 20 shares for \$1,000 in bonds at any time prior to February 1, 1934, the maturity date of the bonds. These warrants will not be detachable unless the notes are called. R. J. Stokes is president and general manager of this company.

Aircraft Control Sold

NEW YORK, Feb. 25—Consolidated Instrument Co. of America has acquired control of the Aircraft Control

Six of 21 Engines Pass Official Tests

WASHINGTON, Feb. 28—Results of tests of airplane engines conducted by the Bureau of Standards during the past year show that "the average manufacturer should do more development work before going into production," according to a statement made public this week by the Department of Commerce. Twenty-one engines were tested as a basis for the granting of approved type certificates by the Aeronautics Branch of the Department of Commerce. Only six passed successfully.

Co. of Philadelphia, designers and manufacturers of apparatus for automatic steering and control of aircraft. The corporation also manufactures a line of aircraft powerplant and navigational instruments. This is the third company acquired by the Consolidated company within recent months.

New Departure Mfg. to Expand Plants

HARTFORD, CONN., Feb. 25—Plans for the expansion of its factories in Bristol, Hartford and Meriden involving the expenditure of several millions of dollars have been announced by the New Departure Mfg. Co. The building program, which is to be extended over the next several months, calls for the addition of a number of buildings and a large quantity of new power equipment and machinery of the individual type. Much of the new equipment to be installed has been developed by the company's own engineers.

Auto-Lite High Earnings Permit Extra Dividend

TOLEDO, OHIO, Feb. 27—Directors of the Electric Auto-Lite Co. yesterday voted an extra dividend of 50 cents a share on the common stock in addition to the regular quarterly dividend of a dollar a share and also voted the regular quarterly dividend of \$1.75 on the preferred stock, all payable April 1 to stockholders of record March 15. This will mean a distribution of \$1,335,000 to the common stockholders and \$73,500 to the preferred shareholders.

Plan Brake Station

CINCINNATI, Feb. 27—Expansion plans, contemplating the establishment of a sixth super-service station at Lexington, Ky., are announced by the Auto Brake Service Co., Bendix distributors in 68 counties in Ohio, Kentucky and West Virginia. The Lexington station, will be housed in a building with a 250-foot frontage.

Jordan Alters Plan of Marketing Cars

Independent Firm to Survey Market Before Output Is Estimated

NEW YORK, Feb. 27—Believing that merchandising is the one weak link in the modern automotive industry, Edward S. Jordan, president of the Jordan Motor Car Co., has reorganized his distributing organization in the eastern territory by the formation of an independent corporation under the name of Jordan Distributors, Inc., headed by Edward J. Murnane, formerly head of the Studebaker agency in New York. It will cover the market from Maine to Virginia with what Mr. Jordan calls Class A distributing units in New York, Boston and Philadelphia.

The company will make periodic surveys of the market, gaging the probable requirements of the market and purchasing cars from the manufacturing company on that basis. Mr. Jordan believes that, instead of the manufacturer figuring what his possible production should be, and loading the market with as large a proportion of that capacity as possible, proper merchandising would require that production be based on the potential demand. Knowing the number of Jordan owners in a given territory, he says, the replacement market is comparatively easy to compute.

The market for new Jordan owners can be gaged by a careful survey conducted by persons who are willing to study the situation carefully and keep close to it, Mr. Jordan says. On this basis, Mr. Jordan feels that selling his cars thus through a merchandising company he will have less of the difficulties currently encountered in ordinary merchandising methods. He believes that this method will do away with price-cutting, over-trading and other evils which have beset the market during the last few years.

Ross, Buick Superintendent, Resigns After Ten Years

DETROIT, Feb. 27—C. J. Ross has resigned as general superintendent of the Buick Motor Company, effective March 1. Mr. Ross is succeeded by L. G. Kurtz, former superintendent of the car assembly operations. Mr. Kurtz has been with the Buick for a number of years as a production executive.

Mr. Ross began his career in the automotive industry in 1904 when he became identified with the Weston-Mott Co., Utica, New York. He moved to Flint with the company in 1907, and when the Weston-Mott company was absorbed by Buick in 1919 Mr. Ross was made general superintendent of the Buick plants, which position he has held since that time. He will maintain his home in Flint and will devote his time to recreation and travel.

Sales Favorable in Leading Centers

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duction is far behind orders that have been pouring in since the six-cylinder was introduced. Buick Motor Co. states its production for the month was about 15,000 cars. The company has scheduled approximately 17,000 units for the month of March, according to C. W. Churchill, general sales manager. Oakland Motor Car Co. produced approximately 27,000 units in its American plants in February and the company reports that production is behind orders.

Reports from leading centers on automotive sales in February follow:

New York

Sales of new cars during February in practically all lines have shown an improvement over January business and in many cases are passing figures for last February. Some of the more popular lines fell somewhat behind in January but it is probable that February sales will bring the average for the past two months about even with the average for the corresponding two months of last year. Ford deliveries are running high with two or three weeks still being required for delivery on certain models, particularly the Tudor sedan and roadster. Ford stocks of Ford sedans and coupes are fair-sized but it is estimated that none of the dealers in this territory have over 25 or 30 Ford cars of all models in stock.

Philadelphia

New car sales for the month of February show indications of exceeding those of January, although definite figures are not yet available. January sales totaled 2258 as compared with 1565 in January, 1928. The increase in Ford shipments as a result of the factory's high production scale is accompanied by no discernible increase in dealers' stocks of this make. Sales in this line are great enough to take care of shipments and deliveries are being hastened. It is a current topic of discussion that Ford is outselling his next highest competitor at a ratio of three to one.

Chicago

New car sales during February were in approximately the same volume as January, the severe weather being largely responsible for the lack of any advance in volume. Ford demand is but slightly in advance of the supply but as yet there seems to be no overlapping of supply.

St. Louis

New car sales during the automobile show were good and have continued satisfactory. In general, sales of both new and used cars are better than last February. Stocks of new cars are about the same as last year, stocks of used cars being about 15 per cent lower than in February, 1928. Ford sales in St. Louis totaled 618 machines in December and 397 in January. The start of the state license year on Feb. 1, instead of Jan. 1, is a factor in small car purchases in Missouri.

Boston

New car orders are coming along pretty

well, but many are not in a hurry to take delivery. The show is holding off many more ready to sign once they make comparisons that week. Ford dealers are getting cars in larger number and they are passing right through to buyers. There is a surprising demand for some other older Ford types. No one make stands out as having had exceptional sales in February. Orders have been fair. Used cars are not moving very fast, and this is holding down new car sales, as some distributors refuse to tie up much more money in the trades. Distributors in some instances are getting dealers to agree to order cars, but not take them, leaving them in the warehouse by payment of a small sum per car for insurance.

Detroit

More than 5000 new cars were sold in Wayne County during the first three weeks of the month and Ford was leading the field by a wide margin. For the first time since the Model A was introduced buyers have no difficulty in obtaining quick delivery. Reports indicate there are quite a few cars of certain lines on hand. However it is agreed that the coming of favorable spring weather will see these stocks greatly reduced. Many dealers have heavy stocks of used cars and are using high pressure methods to move them.

Cleveland

Sales of both new and used cars are breaking records for the month of February. Fully one-third of the total is attributed to Ford business, according to Herbert Buckman of the Cleveland Automobile Manufacturers and Dealers Assn. Dealers' stocks, new and used, are reported fairly small.

Cincinnati

An increase of 18.7 per cent is shown in new car sales for first 25 days in February, compared with last year, and dealers are enthusiastic over conditions. Ford made a big showing, registrations for the period showing 32 per cent Fords in a total of 1200. Two heaviest snows in years followed by zero temperatures brought big demand for chains, winterfronts and other accessories and parts, with sales averaging 63 daily compared with 56 in January. This month's total is expected to exceed last month. Business is generally good and collections in parts of the field, fair.

Milwaukee

While extreme weather throughout February undoubtedly has had an adverse effect on passenger car sales, business is reported to be well above a year ago, when the state of Wisconsin as a whole absorbed 3990 new cars. Probably the worst effect of continued cold, blizzards, etc., has been to delay deliveries. Despite heavy factory output and correspondingly large deliveries to distributors, the movement of cars into buyer's hands is satisfactory. Ford dealers are just starting to make deliveries on orders carried over from last year. Even with the greater number of cars being delivered, Ford dealers here are about a month behind on orders.

Minneapolis

While the output is in the aggregate somewhat behind the figures for a year ago, business is pronounced as good and on the gain. The Ford dealers are absorbing the daily output of 365 cars at the Twin City plant of the Ford Motor Co. and still expect to be from 200 to 300 cars behind orders by the middle of March at the big agencies and graduated down for the smaller companies. Ford dealers report that prospects who own larger cars are trying to trade them in for new Ford cars, and in many instances they will sacrifice as high as \$100 on contracts for higher price cars. In Hennepin county in February Ford dealers delivered 86 more cars than their nearest competitor.

Kansas City

Used car sales, particularly in the low price class, have been slow during the month. Ford sales have gone back into first place, a survey indicates, but this may be due to the fact that dealers of other cars in that price-class are unable to obtain enough cars for delivery, while the Ford delivery has improved. However, Ford dealers report a shortage of cars. The Chevrolet situation here is different in that dealers are dependent on the new assembly plant, and this plant's output still is far below schedule. There seems to be no over-stocking of dealers.

Oakland

Sales of cars of all makes in northern California for February are about the same as for January and also for January, 1928. Used car stocks are also about the same as previous months mentioned, with large supplies on hand. Ford sales for February are about double the nearest competitor, Chevrolet, and about eight times the sales of the next rival, Buick. Most Ford dealers are able to make immediate delivery. There is a big demand for Ford cars, increased by spread of news of immediate delivery possibility.

Denver

In Denver and surrounding territory, so far this year, sales have been at the lowest ebb for 10 years. January was very poor, February is worse. Denver dealers find one ray of consolation in the situation, a great increase in sales directly due to the automobile show, and a tremendous list of prospects. Ford dealers report that with the exception of tudor sedans, and trucks, they are about able to supply the demand, and conversely that the demand seems to about meet present production. Ford dealers have done better than any others handling cars in their class. They report about a normal stock of used cars on hand. Used car stocks are heavier than usual with other dealers.

Seattle

Due to unusually cold weather conditions for this section during the past month retail car sales in the Seattle territory for the month of February dropped 20 per cent below sales for January, and were 25 per cent below sales for February.

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Equipment Business Sets New High Mark

Jobbing, Manufacturing Greatest In History, M. & E. A. Says

NEW YORK, Feb. 28—Activities of manufacturers and jobbers in the automotive parts and equipment business during the first two months of the current year have exceeded any previous activities in the history of the industry, according to the monthly bulletin of the Motor and Equipment Association. Manufacturers and wholesalers have begun the year with a vigorous upward trend in production and sales which promises to set new records for the first quarter and probably for the first half of the year.

As a result of the merger of the Motor and Accessory Manufacturers Association and the A.E.A., this monthly bulletin has been expanded to include conditions in the wholesale field as well as in manufacturing. Figures obtained for indices are now obtained from approximately 300 members who report directly to the association.

January indices for the manufacturing trade, based on January 1, 1925, as 100, show a marked improvement over January of last year with the exception of accessories, which continue in a comparatively weak position. The grand index for all groups for January of this year is 188 as compared with 153 of January of last year.

Original equipment index showing manufacturers' sales of engines, bodies, parts and accessories shipped to car and truck manufacturers is 212 as compared with 163 in January of last year and has been exceeded only by the five months—March, April, May, August and September—of last year. Service parts index for the month is 141 as compared with 137 last year. Index for accessory shipments is 77 as compared with 79 of last year. Shop equipment shipments have shown a marked improvement over last year and reached an index of 173 as compared with 142 last year.



Allen W. Morton
The new president and general manager of the American Hammered Piston Ring Co. He succeeded W. C. Stittinius in that position.

Sale of Wire Wheel Considered Certain

DETROIT, Feb. 28—Reports emanating from New York that the Kelsey-Hayes Wheel Co. has practically completed negotiations to take over the Wire Wheel Corp. of America, whose main plant is at Buffalo, coincide with stories which have been current in Detroit financial and industrial circles for several days. While not confirmed, the merger is believed certain.

The combination would be effected through an exchange of stock. It is further understood that such a merger will provide a way for settling extensive litigation which Wire Wheel has instigated under the Cowles patent covering wheels demountable at the hub.

Wire Wheel has suits pending against the Ford Motor Co. and the Budd Wheel Co. Decision of the District Court in the Budd Wheel suit, brought jointly against Budd and Willys-Overland, which used the wheels in question, have favored Wire Wheel. Kelsey-Hayes, which has large wheel contracts with the Ford Motor Co., is rumored to be acting with Henry Ford.

Huge Steel Mill to be Constructed

Fink Announces \$20,000,000 Project for Plant on Detroit River

DETROIT, Feb. 28—Great Lakes Steel Corp., recently organized, will start construction within 30 days on a \$20,000,000 steel mill on the Detroit River at Ecorse, according to George R. Fink, chairman of the board and president of the Michigan Steel Co. The mill will employ 3000 men. The corporation has 300 stockholders including many Detroit, New York and Cleveland business men. The company has an authorized capital of \$50,000,000 and Mr. Fink predicts that within a few years the mill will be expanded and more units added as the business increases.

The mill will turn out 500,000 tons of steel products, including open hearth steel ingots, billets, slabs, blooms, hot and cold-rolled strip, steel hoop bands, shapes and light plates. The new company plans to work in conjunction with the M. A. Hanna Co. now operating blast furnaces on Zug Island. A railroad will be built to carry hot metals from the furnace to the proposed mill, Mr. Fink explained. He also asserted that the company will work in contact with the Michigan Steel Co. but will not be consolidated with that concern.

Mr. Fink did not care to disclose names of stockholders but some of the directors are: James N. Jarvie and George W. Davidson, New York City; Frank W. Blair, Detroit; Carlton M. Higbie, Murray Body Corp. of America; Charles A. Collins, Cleveland; Elmer R. Milburn, Lacey S. Brown, and Edward L. Wetstein, Detroit.

Hudson to Test Challenge

DETROIT, Feb. 28—Hudson Motor Car Co. will stage an Essex-Challenge week March 4-11 during which time the Challenge models will be submitted to every conceivable test.

Sales Favorable in Leading Cities

(Continued from page 388)

1928. Dealers look for March sales to bring the percentage for the first quarter at least even with the first three months of 1928. At present Ford has not regained the lead made several months ago in sales, Chevrolet sales leading locally. New car stocks are light. Ford is pretty well stocked, having caught up on orders booked ahead. The used car market is not active, stocks of used cars being rather heavy. Credit conditions are good. Repossessions a little bit stronger than usual. Business conditions generally for this section are very good.

Los Angeles

Southern California new car sales are

running approximately parallel with the same month last year. Los Angeles automobile show is opening the first week in March and is expected to stimulate business greatly. Ford sales in this territory show some decrease before increased demand for Chevrolets. General business conditions are reasonably good. Used cars continue to move well and there is continued improvement in truck market.

New Orleans

Ford dealers and others report no unusual sales over last month. Stock of new and used cars is normal with possible slight decrease in used car stocks. The general feeling is that conditions are im-

proving. The Ford dealers report general interest in the latest Ford models.

Dallas

With the exception of Fords the sales and deliveries of automobiles in this section for February were some less than for January, but about the same as for February a year ago. Ford deliveries showed a good increase over January, his sales are now running close to other leaders in the low-price class in this section. Delivery time is being reduced month after month. On some models dealers are making deliveries at the time of sale. With few exceptions most any models will be delivered in 10 to 15 days.

Men of the Industry and What They Are Doing

Veeder-Root Reelects Officers and Directors

At the annual meeting of the stockholders of Veeder-Root, Inc., Hartford, Conn., the officers and directors were reelected. The officers are John T. Chidsey, president and treasurer; Graham H. Anthony, vice-president; John H. Chaplin, secretary.

The directors include: Messrs. Anthony and Chidsey, F. S. Barnes, F. S. Chase, C. B. Cook, H. H. Conland, R. C. Coxhead, L. B. Leavitt, V. R. Leavitt, D. J. Post, C. D. Rice, L. F. Robinson, C. T. Treadaway, C. H. Veeder and F. E. Wolcott.

Net earnings of the company for the eight months ended Dec. 31, 1928, were reported as \$100,911, after all charges including reserve for taxes.

Leroy Succeeds Hart

Appointment of P. E. H. Leroy, formerly assistant treasurer, to succeed P. H. Hart as treasurer of Goodyear Tire & Rubber Co., was announced by directors at their recent meeting. Mr. Hart, in announcing his resignation, said he would leave for a vacation of several weeks in the South and did not announce his future plans. The directors named two new assistant treasurers, Zimri C. Oseland and Hubert H. Hanna.

DePalma Visits Kissel

Ralph DePalma, racing driver and engineer, recently completed a week's visit at Hartford, Wis., as the guest of George A. Kissel, president, and William L. Kissel, secretary and treasurer of the Kissel Motor Car Co. He took occasion to study the Kissel method of making custom-built automobiles.

Noorduyn Joins Bellanca

R. B. C. Noorduyn, for six years assistant to the president of the Atlantic Aircraft Co. and close adviser to Anthony H. G. Fokker, has become associated with Bellanca Aircraft Corp. as personal assistant to the president, G. M. Bellanca.

Timken Appoints Wood

H. H. Wood, formerly chief engineer of the Laclede Steel Co., St. Louis, has joined the industrial department, Timken Roller Bearing Co. Mr. Wood will specialize in the application of Timken bearings to steel mill equipment of various sorts.

Souders Back at Work

George Souders, winner of the Indianapolis Sweepstakes race in 1927, who was seriously injured in a Detroit race about six months ago, is now about fully recovered and has returned to his desk as head of the Souders Service



E. J. Travers

Newly Appointed Director of Advertising and Assistant Sales Manager of Nash Motors Co.

Co., Columbus, distributor for the Gabriel Snubber in central Ohio.

Wood and Davis Appointed

Geuder, Paeschke & Frey Co., of Milwaukee, has announced the appointment of E. H. Wood and Charles E. Davis as representatives for its stamping, forming and pressed steel contract department, Buffalo and Cleveland, respectively.

Weber Opens Business

Charles G. Weber, for five years connected with the Paige Sales Co., Rochester, N. Y., Paige distributor, has opened his own establishment in that city and will handle Graham-Paige cars as dealer for his former distributor employers.

Walker Completes Tour

Helm Walker, vice-president in charge of sales of the Windsor Corp., St. Louis, recently returned from an eastern tour, visiting dealers at New York, Boston, Philadelphia, Pittsburgh, and Chicago, as well as several points in Canada.

Piper Leaves Goodyear

Col. C. M. Piper has resigned as head of the sundry sales department, Goodyear Tire and Rubber Co. He will announce plans later.

Nash Celebrates Birthday

Charles W. Nash, president of the Nash Motors Co., recently celebrated his 65th birthday.

Franklin Off For Trip to Europe With Barton

H. H. Franklin, president, and F. A. Barton, secretary and treasurer of the Franklin Automobile Co., sailed recently from New York for Italy. The two will spend several weeks on the Riviera and in Switzerland, France and England.

Conferences will be held with resident Franklin export men both on the Continent and in England. By the end of the year the company expects to have retail outlets in all the important European automotive markets.

Overseas Men at School

Among overseas representatives who have enrolled in the export sales training school conducted by the Studebaker Corp. of America at South Bend are: R. De Ridder and A. D. Jackson, Brussels; R. de Reineck, Bucharest, and B. Hartkoff, Hamburg. R. R. Swaden, Boston, and A. W. Hulmes, Kansas City, also are taking the course, which was begun recently and is to continue for three months.

Castle Elected President

Col. Benjamin F. Castle, of New York, first American aviation attache delegated by the War Department for foreign service, has been elected president of the Great Lakes Aircraft Corp., Cleveland, William R. Wilson, chairman of the board, has announced.

Berger Mfg. Names Sprott

S. S. French, president of the Berger Mfg. Co., Canton, has announced the appointment of J. S. Sprott, as general manager of sales, effective March 1. During the past eight years Mr. Sprott was vice-president in charge of sales of the General Fireproofing Co., Youngstown.

New Mack Dump Bodies

NEW YORK, Feb. 27—Mack Trucks, Inc., has added a line of standard dump bodies, built of No. 7 gage sheet steel and tapering 4 in. from front to rear. The bodies all have 6-in. full-length running boards with round-corner front, which makes for a smooth rub rail, full length of body and provides a substantial front corner body bumper. The bodies all have manual tailgate operation and are also equipped with a double-acting tailgate.

The company also is offering four-wheel trailers for use in conjunction with trucks. These trailers are available in two capacities, 5 and 10 tons, the designs being similar except as to dimensions. Trailers are furnished either with pneumatic-tired disk wheels or with steel wheels with optional tire equipment.

Few Changes Follow Buying Cook Spring

Ann Arbor Plant to be Division of Barnes-Gibson-Raymond

DETROIT, Feb. 26—Lyman D. Adams, president and general manager of Barnes-Gibson-Raymond, Inc., manufacturer of springs, announces that the plant of the Cook Spring Co., Ann Arbor, which it recently acquired, will be operated without change except for the retirement of A. J. Donally, president of Cook Spring, who has long been desirous of withdrawing from active business. The new unit is to be known as the Cook Spring Co. Division.

Business will be conducted individually at each plant, Mr. Adams explains, with the exception that the purchasing, accounting and cost departments may be combined under central management. Combination of the engineering facilities also is contemplated, because considerable research work is scheduled for the coming year. The sales of the Detroit division will be handled by W. J. Black while W. A. Scholey will conduct this work for the Ann Arbor division.

At a recent directors' meeting the following officers, in addition to Mr. Adams, were elected: F. M. Raymond, vice-president; Mr. Black, secretary; Mr. Scholey, assistant secretary; W. M. Barr, treasurer, and M. E. Donally, assistant treasurer. Fuller F. Barnes is chairman of the board.

Ainsworth Company Being Reorganized

DETROIT, Feb. 28—Ainsworth Mfg. Corp. is being organized under the laws of Michigan to take over all of the business of Ainsworth Mfg. Co., engaged in the manufacture of windshields, garnish moldings, rolled shapes, foot rails, stampings and machined products for the automotive industry. The company was organized in 1915 with an original investment of \$20,000. With the exception of \$180,000 paid in subsequence to its organization, the company has reached its present financial position entirely from earnings.

The corporation has authorized 200,000 shares of common stock of which 116,149 shares are to be presently outstanding. The remaining 83,851 shares will be authorized for future expansions, acquisition of other properties and other corporate purposes. Dividends will be inaugurated on the common stock at the rate of \$2.50 per share per year payable quarterly beginning June 1. The management will continue in the hands of the men responsible for its present success and no change in personnel is contemplated.

Current assets total \$1,263,937, of which \$412,306 is cash and United States municipal and county obliga-

tions against total liabilities including reserves of \$262,223, a ratio of better than 4.8 to 1. Earnings for the year ended Dec. 31, 1928, adjusted for elimination of officers' profit-sharing contract and bonus to employees and less Federal taxes, were \$480,272.

Earnings of Twin Coach Announced as \$328,439

AKRON, Feb. 26—Twin Coach Co. of Kent, near here, announces a sales volume for 1928 of more than \$4,300,000 and profit of \$328,439, after all charges and absorption of \$100,000 of the previous year's deficit. Assets are \$1,815,541 against liabilities of \$949,951.

Frank R. Fageol, president, and other officers and directors were reelected at the annual meeting. Mr. Fageol said 58 of the foremost transportation companies in the country use the company's buses. Twin Coach has attained second position in sales volume to electric railway operators and first place in its sales volume of 40-passenger capacity coaches for 1928, according to the president. The company began production in July, 1927.

Aeronautical to Add Stock

NEW YORK, Feb. 25—Aeronautical Industries, Inc., organized May 8, 1928, in its first report dated Jan. 31, 1929, shows capital invested in aeronautical enterprises as \$712,805 and in cash and call loans, \$443,748. Its investment quotations show an appreciation of \$137,827. The company plans to issue 400,000 shares of stock, the plan being held in abeyance for approval of holders of voting stock certificates.

Muncie Gear Earns \$13,265

MUNCIE, IND., Feb. 26—Muncie Gear Co. reports profits for the month of January of \$13,265 after all charges except Federal taxes. This compares with a loss of \$5,000 in January of last year. The improvement is due partially to increased business but principally to greater plant efficiency and improvement in methods of manufacture, according to K. A. Spurgeon, general manager.

G. M. Sells 282,157 Cars

NEW YORK, Feb. 25—Sales of General Motors cars abroad, exclusive of Vauxhall Motors and the products of the Yellow Truck & Coach Mfg. Co., during 1928 totaled 282,157 cars as compared with 193,830 in 1927. This marks an increase of 45.6 per cent. Sales in the fourth quarter were 71,867 as compared with 52,493 in the corresponding quarter of 1927.

Perfect Circle Net \$277,447

HAGERSTOWN, MD., Feb. 26—Perfect Circle Co., manufacturer of piston rings, reports net profit to surplus for the six months ended Dec. 31, 1928, as \$277,447, after deducting all charges including predecessor corporations' tax.

Financial Notes

Motor Wheel Corp. reports net income for 1928, after all charges, as \$2,915,044. This is equivalent to \$4.24 a share on outstanding stock and compares with \$1,542,834 profit, or \$2.70 a share, on outstanding stock for 1927. Preferred stock was retired on Oct. 15, 1927. Regular quarterly dividend of 50 cents was declared payable March 30 to holders of record March 5.

Chicago Yellow Cab Co. has declared three monthly dividends of 25 cents each payable April 1 to holders of record March 20, May 1 to holders of record April 19, and June 1 to holders of record May 20. Net earnings for January, after taxes and charges, were \$295,080, equal to 74 cents a share of 400,000 shares of no par value.

Hart-Parr Co. reports net profit for the quarter ended Jan. 31, the first of its current fiscal year, as \$497,433 after all charges. This is equivalent, after preferred dividends, to \$2.22 a share on common stock and compares with profit of \$83,312 for the corresponding quarter of the previous year.

Jackson Motor Shaft Co. and subsidiary company report consolidated net profit of \$283,729, for 1928. Net income for 1927 was \$172,072, or \$1.91 per share. Current assets at the close of 1928 totaled \$472,654, against current liabilities of \$409,776. Corporate surplus is \$247,484.

Hupp Motor Car Corp. 1928 net income was more than treble that of 1927. The firm reported net of \$8,790,220 for last year, equal to \$8.12 a share on 1,082,480 shares, compared with \$2,719,164 or \$2.70 a share on 1,005,189 shares in 1927.

Kelly-Springfield Tire Co. reports a loss for 1928 of \$2,490,512. This compares with net profits of \$357,741 for the preceding year. The balance sheet for Dec. 31 shows a ratio between current assets and current liabilities in excess of 16 to 1.

Electric Auto-Lite Co. reports gross sales for 1928 of \$49,000,000, toward which battery sales contributed \$20,000,000. The company anticipates \$25,000,000 of business in batteries out of an estimated total gross of \$75,000,000 for 1929.

Goodyear Tire & Rubber Co. of California reports net profit of \$1,882,966 for 1928 after charges. This compares with net profit of \$2,103,432 in 1927. Sales totaled \$26,109,252 against \$23,590,315 in 1927.

Wright Aeronautical Corp. has approved an increase in capital stock from 500,000 to 1,500,000 shares and has voted a 100 per cent stock dividend payable April 30 to holders of record April 15.

Electric Storage Battery Co. has declared quarterly dividends of \$1.25 each on Class B and preferred stocks, respectively, both payable April 1 to holders of record March 9.

Kelsey-Hayes Wheel Corp. has declared quarterly dividend of 50 cents payable April 1 to holders of record March 21.

Albion Chamber of Commerce Reports Growth of Six Firms and Large Employment Increase

ALBION, MICH., Feb. 27—An increase of nearly 50 per cent over the number employed at this time last year is revealed in an industrial survey just completed by the Chamber of Commerce. A proportionate improvement in general business conditions is also reported from this rapidly developing city of close to 10,000. Manufacturers reported a total of 1162 employed in 1927-28, while the figure now stands at 1668.

Albion's industries depend a great deal on the automotive trade, according to the report. The winter of 1927-28 was a period of depression due to the general automobile business slump, but the present employment figures even show an increase over the total in 1926 when but 1280 were employed in factories.

During the past two years, a gradual but definite expansion has been experienced by several Albion plants, the Gale Mfg. Co., maker of gray iron castings,

having built on a large addition. The Union Steel Products Co. has recently acquired the property formerly occupied by the Thwaites Furniture Co., including floor space of over 70,000 sq. ft. Union Steel is adding to this and employs more than 400 men and women.

One of the city's newest industries, the Decker Screw Products Co., maker of bolts and nuts, has progressed by leaps and bounds since its organization in the fall of 1927, and now plans a new home. It is expected that construction will start in the spring. Another plant, the Albion Metal Products Co., maker of windshield screens, and the Mack Paint Spray Gun Co., also plans considerable expansion in the near future.

The Service Caster & Truck Co., maker of indoor rolling equipment, is another progressive concern, and has plans ready for an addition in the spring, according to the chamber's report.

Parts, Equipment Exports Increase 24.8 Per Cent

WASHINGTON, Feb. 25—Exports of automobile parts, accessories and service station equipment from the United States last year had a total value of \$81,189,013, representing an increase of \$16,140,442, or 24.8 per cent, over the previous high mark of 1927, according to the Department of Commerce.

Shipments under these three classifications constituted 15.5 per cent of the total amount of automotive products shipped to foreign markets last year.

The value of exports of parts, accessories and service appliances has steadily increased during the past five years, as shown by the following figures, including the pre-war year of 1913: In 1913, exports were \$6,270,116; in 1924, \$31,627,730; in 1925, \$43,257,018; in 1926, \$52,215,628; in 1927, \$65,048,571; and in 1928, \$81,189,013.

Shipments of replacement parts accounted for the greater share of these exports, amounting to \$64,252,976 or 79 per cent of the total.

Site Bought for Making Savoia-Marchetti Planes

NEW YORK, Feb. 27—American Aeronautical Corp., recently organized to produce and sell in this country the Italian Savoia-Marchetti seaplanes, has purchased a site for a factory near Port Washington, L. I. It is anticipated that this plant when erected will have a capacity of 500 seaplanes and amphibians a year.

The first plane to be produced by the company will be built in a rented factory. It is to be a popular priced amphibian, a three-passenger biplane of the S-56 type, and is to be ready for

delivery in May. The larger planes of the S-55 and S-62 type, carrying 14 and 7 passengers, respectively, will be ready for delivery in June, according to present plans.

Bosch Buys More Land

SPRINGFIELD, MASS., Feb. 25—American Bosch Magneto Corp. has bought 93,000 sq. ft. of land adjacent to its plant for future expansion of its factory. Production of magnetos, ignition sets and timers has been very good at the Bosch plant of late, according to officials.

Marmon Ships Trainload

INDIANAPOLIS, Feb. 26—Marmon Motor Car Co. has shipped a solid trainload of its new Series 68 and 78 to its Montreal distributor. Production in these series is approximately 100 cars daily, officials announce.

To Test New German Bus

BERLIN, Feb. 23—An urban-type of bus chassis with Voran front-wheel drive, of the same design as that recently placed in service by the Berlin General Omnibus Co., has been delivered to the London General Omnibus Co. and is to be placed in trial service.

Ohio Reports Vehicles

COLUMBUS, OHIO, Feb. 25—The report of the Department of Motor Vehicle Registration, under the charge of Col. Chalmers R. Wilson, covering registration of all types of motor vehicles during 1928 in Ohio shows that there were 1,440,909 passenger cars, 198,658 motor trucks, 7410 motorcycles, 2362 side cars, 14,570 trailers and 3989 dealers licensed during the year. The total number of motor vehicles was 1,711,026,

which is an increase of 81,917 over the registration records of 1927.

American Metal Products

Changes to Tubeweld, Inc.

DETROIT, Feb. 27—The name of the American Metal Products Co. has been changed to Tubeweld, Inc., and George B. Storer, formerly vice-president of American Metal Products, heads the new company which has moved from the American Metal Products building on Epworth Blvd. to 14150 Oakland Ave., where it has leased space in one of the Highland Park buildings of the Ford Motor Co.

Tubeweld, Inc., holds contracts for manufacturing several items for Ford, including steering columns, torque tubes and service brake shafts. It is understood that F. C. Matthaei, president of the old American Metal Products Co., has formed American Metal Products, Inc., which will occupy space vacated by Tubeweld. Mr. Matthaei is expected to announce initial plans soon.

Garage Uses 24 Floors

for Automatic Parking

NEW YORK, Feb. 28—Kent Automatic Parking Garage, 209 E. Forty-third St., which is to be opened for use tomorrow, has 24 floors of parking space, accommodating from 12 to 24 cars per floor. The cars enter the building under their own power, after which all the operation is carried on automatically by Kent electric parkers, controlled from within the elevator. No person other than the elevator operator enters the parking floors, so that liability of theft is reduced to a minimum. This is the first of 10 such garages to be erected in New York, five of which will be started this year.

Bus Opportunity in Latvia

WASHINGTON, Feb. 25—Regulations which will probably necessitate the withdrawal from service in Latvia of a large percentage of motor buses now in use will become effective June 1, according to the Department of Commerce. The department points out that there is a possibility for sales of chassis in Latvia to replace those taken out, and the automotive division has on file a translation of the new regulations for the benefit of American manufacturers.

Chrysler Advertising Grouped

DETROIT, Feb. 26—Announcement is made by J. E. Fields, vice-president in charge of sales, of the Chrysler Corp., that the advertising of all Chrysler divisions will be handled after March 1 by Advertisers, Inc., of Detroit.

Use 6,093,267 Lb. Babbitt

WASHINGTON, Feb. 26—The total apparent consumption of Babbitt metal in January, based on reports of 31 firms to the Department of Commerce, was 6,093,267 lb., compared with 4,985,942 in December and 4,928,517 in January, 1928.

Industry Continues Demand for Steel

Question if High Mark in Automotive Orders Has Been Reached

NEW YORK, Feb. 28—Finishing mills continue to operate at capacity because of the heavy call for automobile sheets. Most plants have been running in the last few weeks at better than their capacity rating, and for all that it is difficult to keep consumers satisfied in the matter of shipments. Strip mills are very much in the same position. Capacity of cold-finished bar plants is also under more pressure. Automotive alloy steels are moving in heavy tonnages. There is, however, in evidence in the steel market a growing undercurrent of uneasiness as to whether the peak of automotive demand has been reached and when production gears must be shifted from the high now in use.

It is accepted as axiomatic in the steel market that a slowing down in automotive production will be felt thirty days earlier in the specifications and shipping instructions received by steel mills. In the past this transition has not always been as gentle as steel mills would like to have it, frequently taking the form of arbitrary demands for postponement of shipments which upset mill schedules so much that they are looked upon as sugar-coated cancellations. It is, therefore, little wonder that so much is heard just now in the steel market about May 1 no longer to be depended upon as the seasonal turning point in automotive production, and that an easing off in steel demand in March is a contingency that must be taken into consideration.

The leading concern's sheet rolling subsidiary has followed the lead of independents in announcing a \$2 per ton advance in black and blue annealed sheets. Bearing the date of Feb. 28, one of the independents has issued the first of the new cards of extras on cold-rolled strip, increases ranging approximately from \$2 per ton on many of the wider sizes to \$8 per ton on one particular width. What the base price will be with the more general going into effect of the new card of extras is not known so far. The supply of semi-finished steel is tight, and some non-integrated rollers are reported to have had difficulty in getting all their requirements filled as promptly as their needs called for. Several Youngstown mills are marking up their prices for sheet bars and billets.

Pig Iron—Interest in second quarter contracts is on the increase. Valley furnaces are asking \$18 for No. 2 foundry, but some producers of malleable have marked up their price for that grade to \$18.25. The Michigan price continues firm at \$20.

Aluminum—Automotive demand for foundry metal continues brisk and heavy tonnages are being worked up into pistons and

Prohibition Agents to Visit Garages

WASHINGTON, Feb. 28—Federal Prohibition agents have been ordered by Prohibition Commissioner Doran to investigate the sale of denatured alcohol by garage owners and filling station proprietors with a view to preventing dilution of the alcohol when sold to motorists as an anti-freezing agent. Commissioner Doran pointed out that such alcohol is manufactured, branded, labeled and sold under Government regulations and must reach the purchaser in the exact condition as when produced at the denaturing plant.

other castings. Virgin metal remains at previously pegged levels. Remelted rules strong with clean scrap bringing relatively high prices.

Copper—The latest advance in the copper market to 18½ cents, delivered Connecticut and 18½ cents, Middle West, is attributed to repeated advances in the London standard market and not to the purchases of domestic consumers, although the latter ran in excess of 10,000 tons last week. Copper and brass products have been marked up to the extent of the advance in the metal.

Tin—While somewhat steadier, the market is quiet, consumers not showing much interest in offerings.

Lead—Storage battery manufacturers have been active as buyers. The market rules firm to strong.

Zinc—Demand is only moderate, but paucity in the ore supply furnishes a good prop for values.

Dingley and Parker Made Vice-Presidents of Stutz

INDIANAPOLIS, Feb. 26—Due to the advancement of Col. E. S. Gorrell to president and of Edwin B. Jackson to chairman of the board of the Stutz Motor Car Co. of America, Inc., Col. Gorrell announces that the board of directors has appointed Bert Dingley and E. R. Parker as vice-presidents to fill the vacancies.

Mr. Dingley came to the company as service manager in the fall of 1925, and was advanced to the position of assistant to the president in November, 1928. He was known as a race driver in the early days, until an accident in 1914 ended his racing activities. After service in the building of Liberty motors during the World War, Mr. Dingley was with the service departments of the Marmon and Franklin companies.

Mr. Parker joined the Stutz factory organization as general sales manager in August, 1928, after 18 years in the industry, during which period he was at different times with Chandler, Willys-Overland and Studebaker in various sales executive capacities.

New \$750,000 Plant Planned for Toledo

Miniger and Lint Support New Project for Making Automotive Parts

TOLEDO, Feb. 26—The City Auto Stamping Co., a new automotive industry in Toledo, is to make an immediate investment of \$750,000 in plant and equipment, it was announced yesterday, and as soon as possible production will start on heavy stampings for automobile bodies, fenders, radiator shells, and similar equipment.

C. O. Miniger, president of the Electric Auto-Lite Co.; Amos Lint, president of the City Machine & Tool Co. here, and associates are supporting the new enterprise. Shareholders of the City Machine & Tool Co. will be given right to subscribe share for share for the new company stock at \$6 each for the 150,000 no par common shares.

Management of the machine-tool and the stamping companies will probably be identical following this plan of organization. Officers of the City Machine & Tool Co., which has extensive contracts for dies, tools and other equipment for automotive plants, include Mr. Lint, president; Frank Landwehr, secretary of Auto-Lite, vice-president; R. D. Mills, treasurer, and Leroy Eastman, secretary and counsel. Other directors include Mr. Miniger, G. B. Ireland, and H. C. Collin, of Collin, Norton & Co., brokers.

Tire and Sundries Show Drop to \$158,715,000

NEW YORK, Feb. 26—Tire and tire sundries manufactured during the fourth quarter of 1928 attained a value of \$158,715,000, according to statistics compiled from the fourth quarter questionnaire sent out by the Rubber Association of America, Inc. This compares with \$162,333,000 for the corresponding quarter of 1927. Total production for the year reached a value of \$771,066,000 as compared with \$785,419,000 in 1927.

Crude rubber consumed in this manufacturing during the fourth quarter was 92,972 tons as compared with 60,592 tons for the fourth quarter of 1927. Crude rubber consumed for the year in the manufacture of tire sundries totaled 345,339 tons and compares with 291,186 tons for the year 1927.

Planes Use Coal Gasoline

LONDON, Feb. 23—For two weeks airplane engines have been operating at Stag Lane Airdrome on gasoline produced from coal. The fuel, which is obtained by altering the chemical composition of heavy oil under pressure and temperature, is said to have high anti-knock qualities which make it especially suitable for high compression engines.

Implement Concerns Decide on Merger

CHICAGO, Feb. 25—Consolidation of three of the largest and oldest farm implement manufacturing concerns and formation of a new \$50,000,000 concern—a merger of the Oliver Chilled Plow Works, South Bend, Ind.; the Nichols & Shepard Co., Battle Creek, Mich., and the Hart-Parr Co., Charles City, Iowa, was agreed on at a meeting of officials of the companies in Chicago.

Details of the terms of the merger were not announced pending the calling of stockholders' meetings in the near future to ratify the agreement. It was stated, however, that financing of the new company will provide a substantial amount of additional working capital.

The Oliver Chilled Plow Works was founded in 1855 by James Oliver, who was the inventor and pioneer manufacturer of chilled plows. The Nichols & Shepard Co. was founded in 1848 by John Nichols and is the oldest incorporated company in Michigan. It was a pioneer in the manufacture of thrashing machines. It also makes combine harvesters. The Hart-Parr Co. was organized in 1901 and was the first concern to manufacture farm tractors.

To Increase Advertising

BRIDGEPORT, PA., Feb. 23—Celeron Co. of Bridgeport, manufacturers of silent automotive timing gears and other products, increased its advertising appropriation 50 per cent over 1928. The media selected are: National and business publications, signs, booklets, novelties. The company recently increased plant facilities and is now producing timing gears at the rate of 4,500,000 annually, officials announce.

Hug Announces New Truck

HIGHLAND, ILL., Feb. 23—A new road builder truck with a 4 cu. yd. body with power hoist has been announced by the Hug Co. of this city. It has a wheelbase of 117 in. and sells at \$4,500. In the new model the front axle is moved back 18 in. to insure a more uniform distribution of the load on the

Wright Receives Crosses for Kitty Hawk Flight

WASHINGTON, Feb. 23—Secretary of War Davis this week presented to Orville Wright two Distinguished Flying Crosses awarded by Congress to Orville and Wilbur Wright for their successful airplane flight at Kitty Hawk, N. C., on Dec. 17, 1903.

four wheels and thus to reduce the pressure in the subgrade. Five forward speeds and two reverse are provided by the transmission. A 6-in. I-beam frame is used and is guaranteed for the life of the truck.

St. Louis Salvage Yard Scrapping 35 Cars Daily

ST. LOUIS, Feb. 25—During the four months of its operation the salvage yard operated by St. Louis Automobile Dealers Association has purchased 3150 unsafe and worn-out automobiles. Cars arrive at the yard at the rate of 20 a day and wrecking operations have been increased to 35 cars a day.

The various grades of metal are separated and cut into 15-inch lengths to be shipped to smelters in the St. Louis district. The yard has its own laundry for salvaging wiping rags from the upholstery of the old cars, selling the rags at a good profit. Cotton, hair and old leather are also marketed. The yard occupies 10 acres.

Canada to Have New Plant

WASHINGTON, Feb. 25—A new service station equipment plant is under construction in Winnipeg, according to a report received by the Department of Commerce. The plant, costing \$75,000, will manufacture oil storage tanks, steel drums and equipment for service stations and will partially make range boilers, pumps, air compressors, car washers, auto lifts and paint-spraying machinery, the report says.

Fisher Will Build Factory at Seattle

SEATTLE, Feb. 25—Recent rumors to the effect that the Fisher Body Corp. would expend approximately \$7,000,000 in an expansion program here have been confirmed by E. F. Fisher, vice-president, in announcing the first expenditure of \$50,000 for the 16-acre factory site on East Marginal Way at the foot of Barton Street.

A \$1,500,000 plant will be rushed to completion on this property with work scheduled to start March 15. The factory will employ between 400 and 500 when it is opened some four months hence. Its raw materials—lumber and veneer—will be purchased from mills on Puget Sound.

It has been found there is an ample supply of veneer in this locality, and there is no need to amplify the production. The new Fisher plant will handle the raw materials and work them into finished products for eastern assembly plants.

Graham Urges Parts Sales

SPRINGFIELD, MASS., Feb. 25—More attention to maintenance and sales of accessories was urged as a saving measure for automobile dealers by M. D. Graham, representing the National Automobile Dealers Assn. at the annual pre-show dinner of the Springfield Automotive Dealers Assn. He reminded the dealers that only 37 cents of each dollar expended by the American public for motor needs goes for new cars, and it is up to the automobile dealers to get their share of the remaining 63 cents.

Reorganize Parts Distributor

REGINA, SASK., Feb. 26—J. A. McKenzie, Ltd., succeeds the Independent Electric Co., Ltd., March 1 for continuing the distribution of automotive accessories, parts, garage tools and equipment. No change in directors has been announced, and John A. McKenzie who organized the first company becomes president of the second.

Calendar of Coming Events

SHOWS

Eoston, Mass, Mechanics Bldg.	Mar. 2-9
Geneva Automobile Show	Mar. 15-24
Leipzig, Germany, Fair	Mar. 3-13
Lyons, Fair	Mar. 4-18
Nice, Automobiles	Mar. 5-20
Vienna, Samples Fair	Mar. 10-17
Marseilles, Automobiles	Mar. 17-28
Nantes, Commercial	Apr. 4-15
Lille, Commercial	Apr. 6-21
All-American Aircraft Show, Detroit Board of Commerce, Detroit	Apr. 6-14
Milan, Trucks	Apr. 12-27
Jugo-Slavia, Automobiles	Apr. 20-28
Budapest Auto Salon	May
Melbourne Automobile Show	May 2-11
International Aircraft Exhibition, Olympia, London	July 16-27
Paris, Automobiles	Oct. 3-13
London, Automobiles	Oct. 17-26
Prague, Automobiles	Oct. 23-30

Paris, Motorcycles	Oct. 23-Nov. 3
M.E.A. Show, Chicago	Nov. 4-9
N.S.P.A. Show and Convention, Detroit	Nov. 11-16
Berlin Auto Salon	Nov. 14
London, Trucks	Nov. 7-16
Paris, Trucks	Nov. 14-24
London, Motorcycles	Nov. 30-Dec. 7
Brussels Auto Salon	Dec. 7

CONVENTIONS

Marketing Executives Conference, Hotel Gibson, Cincinnati	April 3-5
Annual Meeting National Foreign Trade Council, Baltimore	April 17-19
American Society of Mechanical Engineers, Detroit	May 1-3
American Management Association, New York	May 6-11
National Highway Traffic Association, Hotel Stevens, Chicago	May 13-15

RACES

Daytona, Fla.	Mar. 1-15
Akron	May 12
Gardner Trophy (Aircraft), St. Louis	May 28-30
Indianapolis	May 30
Detroit	June 9
Altoona, Pa.	June 15
Salem, N. H.	June 29
French Grand Prix	June 30
Akron	Aug. 18
Syracuse	Aug. 31
Altoona, Pa.	Sept. 2
Cleveland	Sept. 15
Salem, N. H.	Oct. 12

S. A. E.

Summer Meeting, Saranac Lake, June 25-28